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ABSTRACT

The main body of this pamphlet presents science career exploration activities for women in the form of six modules. Complete modules can be used as presented or activities may be adapted or borrowed to suit individual situations. The modules are titled: (1) Turning A Girl Onto Science Careers; (2) What Do I Want Out of Life?; (3) How Do Parents and Friends Affect a Woman's Career Choice?; (4) What Careers Are Available?; (5) What's it like to be a Professional Woman in a Science Career?; and (6) OK, I'm Sold on Trying a Science Career, But How Do I Get From Here to There? In addition, some information on how to use the modules is presented along with a discussion of sources of conflict in females at adolescence. (DB)

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SCIENCE CAREER EXPLORATION FOR WOMEN

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Walter S. Smith

and Kala M. Stroup

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Science Career Exploration for Women

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This book and the attitudes it reflects about women and their roles as parent, spouse, and career person have been profoundly influenced by the example, concern, and contributions of our spouses, Caryl K. Smith and Joe Stroup, and by our children, Russell Smith and Megan and Chandler Stroup. This book is dedicated to the hope that others may share the support which allows personal choice and fulfillment that we find in our own families.

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Why Career Exploration For Women?

Uncovering the secrets of protein synthesis, discovering a new subatomic particle, charting the ocean floor, helping a community with its health problems, teaching about the natural world, designing a bridge, questioning a corporation about its land use plans—the list of jobs to do goes on. Many of the crucial and exciting questions of the twentieth century are being attacked by people in science-related careers. Physician, engineer, teacher, nurse, chemist, veterinarian—and many more— represent career areas to which your outstanding students can aspire. Students who are talented in math and science can look forward to the potential of very fulfilling careers, if they can use their talents to the fullest extent possible. Part of our job in teaching or in other careers focusing on the welfare of youth is to help students explore career options, so that they can get the maximum use of their talents and potentially receive the self esteem and satisfaction from using these talents in important ways.

The capabilities to be successful in professional, science-related careers reside in all kinds of students—black and white, rich and poor, Christian and Jew, native American and foreign born, male and female. Evidence may exist that more talented students are found at this time in one group or another (e.g., the National Assessment of Educational Progress has shown a greater mean science score among 17 year old males than females). However, regardless of these data about groups, outstanding math and science talent—the kind of ability needed in a professional, science-related career—is found in all groupings of individual students. Part of our job in teaching is to recognize these talented students, wherever they are found, and to encourage them to consider

pursuing a professional, science-related career. Of course, students make their own career choices, and rightfully so; but teachers occupy a potentially powerful position to influence and guide students in the career selection process.

Unfortunately, women and men have been steered in the past by parents, friends, teachers, books, and that amorphous thing called "society" into certain careers because of their sex. Nearly 100 percent of all nurses, but only 7 percent of doctors, are female. The vast majority of dental hygienists are women, and an equal majority of dentists are men. Ninety-nine percent of engineers are men. And the list continues. Talented women have typically not been encouraged to develop and use their talents in a career; or if they have chosen to pursue a career, their choice of career has been limited. On the other hand, men have been "naturally" presumed to be required to select and train for a career. Although their choices include a broader range than for women, if they seek to be considered a successful career person their choices are also relatively narrow.

This situation of narrow career choice is radically changing, at least for women. Although women have always played an important, though smaller, part in the American workforce, there is increasing recognition of the facts that (1) women constitute about 40 percent of the workforce and that percentage is steadily increasing, (2) well over 90 percent of all women are employed sometime in their adult lives, (3) a majority of young women can look forward to at least twenty-five years of paid, fulltime employment, and (4) among the more talented women, a larger proportion will be employed for even a longer period of time than less talented women.[1] As women have recognized that they will want to be employed as an adult and that they may attain greater self fulfillment from non-traditional careers, increasing numbers of women are enrolled in college degree fields which have heretofore overwhelmingly been male domains. About seven percent of physicians are female, but nearly 20 percent of physicians in training are female. Slightly less than one percent of engineers are women, but about five percent of engineering students are women. Similar dramatic increases in the proportion of women in professional, science-related career college programs are occurring in the 1970's in veterinary medicine, dentistry, research science (Ph.D. programs) and other careers. Part of our job as teachers is to recognize and take into account these dramatic trends as we talk about careers with our talented women students. We must recognize that deep rooted changes have occurred and that our women students, as a rule rather than an exception, are planning for a career as part of their adult lives.

[1]We have been careful to refer to paid employment as distinguished from work, for after all, nearly 100% of all women and men do work, but sometimes, and especially for women, the work is not salaried.

Talented Women

This book is aimed at science teachers, counselors, and others who work with young women of high school and college age. The purpose of the book is to provide tools that can be used to help young talented women students explore careers, especially those science-related professional careers which require university training and have historically been underrepresented by women. The talented women are those women in at least the upper quarter of students in math and science ability. While the remainder of the women students and all men students could also profit from career exploration, this book is aimed at the talented women students who have special needs (see chapter II) and who can reasonably be expected to have the talent necessary to pursue a professional, science-related career.

Who are these women students? You should recognize some of these women in your classes.

Sally was enrolled in a friend's high school ninth grade biology class. She was a star, always two jumps ahead of her classmates as they discussed problems raised by the teacher. She was inquisitive, excited about science, and willing to work hard to find answers. One day in the following year she bumped into my teacher friend in the hallway. She mentioned that she had decided to study piano (at which she was fair, but not outstanding) because it seemed like the proper thing to do. She said that it just wasn't right for a girl to work hard at science for nothing. My friend was stymied. What could he have done or what could he do now to show her that such a career was "OK" for a woman; that she could pursue a professional, science-related career and still fulfill the other roles (parent and spouse) of which she dreamed; and that she could use her obvious talents to achieve personal fulfillment through science?

Joan, like Sally, talented in science, told me one day that she wasn't going to attend college. Her parents had informed her that there would be just enough money to send one child to college and that it would be better to support Joan's younger brother, "because he needed a college education and she didn't." Joan accepted her parents' wisdom, for she didn't have a clear notion of what she wanted out of life. The conventional wisdom that a woman, after high school would take a secretarial job, while waiting for "her lucky day," then marry and raise a family, was acceptable, if not exciting. What could I have done to help Joan look at her capabilities and aspirations, to augment her decision making process, and to manage her life, instead of drifting with the tide of popular opinion?

Gretchen was enrolled in my high school chemistry class. She was certain that she planned not only to become a parent and spouse, but also to prepare for and pursue a career—but what career? She would be

entering college in a little over a year and needed counseling, planning and assistance in making some decisions. How should she go about that process? What options were appropriate for her? Where could she get information? How could she use her talent and interest in science?

One day, after I had started working with college students, Sue, a sophomore, came to me for routine class enrollment in her intended major in elementary education. In the course of our conversation she offhandedly mentioned that she had written down elementary education on one of those enrollment forms we require of students, but she wasn't sure why she had done so. Really she liked science, but wasn't sure how to translate that interest into a career. By this time I was prepared and could suggest several avenues—where to get information, women science career people to talk to, decisions to be made—that she could pursue in her own exploration of a science career.

We all encounter women like Sally, Joan, Sue, and Gretchen, and other women with variations on these themes. We can do something very positive to help these women, if we understand the special needs of women and possess the necessary knowledge and resources.

How to Use This Book

There never seem to be enough minutes in the day and days in the year to teach the biology, chemistry, geology and physics that should be included in our courses. This book takes this fact into account. Chapter III is organized into modules which can be used separately or as a package to help your talented women students explore professional, science-related careers. You can choose among and adapt the modules as you deem appropriate and as the modules fit into your time frame and resources. Some activities could be incorporated into your course, but most modules probably are more useful when used independently of a course.

As much as possible, the modules suggest activities which the students can do as "independent study," with varying degrees of guidance. You may suggest selected activities casually to students in conversation after class. You may gather a group of talented women from your school for a special Saturday or evening workshop. A science teacher and counselor might work together with each student using activities which best fit his or her own style and capabilities. An area-wide science teachers organization (such as the various state science teachers associations) or an area-wide counselors group may organize career exploration workshops for students from a geographical area encompassing several school districts. Some activities may be used in schools

which schedule "mini-courses" or "short courses" on topics of special interest. Many universities have women's resource centers, science departments, or counseling offices which can be called upon to form a cooperative venture. Organizations like Society of Chemical Engineers, Association of Women in Science, and American Medical Association have local chapters that can be called upon for assistance.

The point is that the modules are flexible. Determine your need and resources. Then adapt the modules to your situation.

One Use of the Modules

Kansas University's Emily Taylor Women's Resource and Career Center used ACT test scores to identify a group of Kansas high school senior women who were in the top 15 percent of seniors in math and science ability and who had completed at least two years of science and three years of math in high school. These women were invited to attend one of five one-day Career Exploration Workshops held in various population centers throughout the state. In addition, parents were invited to take part in some predominantly separate, but coordinated, workshop sessions.

In each session the students looked at and discussed their capabilities, described their anticipated life style ten years in the future, analyzed their decision making procedure and influences on their important life decisions, described their perception of a woman in a science career, shared their findings about capabilities and aspirations with their parents, and finally talked, along with their parents, with women actually pursuing professional, science-related careers. The parents, independent of their daughters, listed their daughters' science-related abilities, described their own hopes for their daughters' futures, shared their findings with their daughters, and took part in the discussion with women science career role models. The students were shown how to obtain additional information about science careers and were given suggested activities to continue at home.

Each of the women attending the workshops completed a questionnaire after her first college semester. Approximately 50 percent of these women indicated a choice of professional, traditionally-male, science-related careers such as engineer, physician, or veterinarian. This proportion was significantly greater than the approximate 25 percent of comparable women in the preceeding high school class who had chosen similar careers. Some of this increase was due to the gradual, but persistent, increase of women in these fields during the 70's. However, we feel confident that such a dramatic increase was attributable, at least in part, to the workshop activities and follow-up.

Notes On The Use of These Activities

We do not believe that every woman skilled in math and science should choose a science-related career. The choice of career is entirely one's own. However, we feel an obligation to help our students choose careers consistent with their capabilities and life style aspirations from the *entire* range of possible careers. A *conscious choice* from a *wide range of options* offers the best hope for self fulfillment, personal satisfaction, and maximum contribution to society.

As our students take part in career exploration, their exploration logically does not need to be limited to science-related careers. The modules in Chapter III could be adapted to other career areas. However, many women possess talent in science; and teachers and counselors do work with these students. These modules are geared to this audience, but we must not limit our talented women students' choice to professional science-related careers, any more than we should formerly have been limiting them to "women's work."

While the authors recognize that only a rather small, although increasing number of women have worked in professional, science-related careers, we cannot overlook the fact that women have made and continue to make significant contributions in all science areas. Margaret Sanger in public health, Dixie Lee Ray in uses of atomic energy, and Rachel Carson in ecology come to mind as well known contributors in science, but countless others have made large and small contributions throughout the nineteenth and twentieth centuries.

Sometimes we worry that we have no right as teachers to take an advocacy role in our students' career selection process. This "hands-off" position asserts that students should make their own choices and that we should not take advantage of our position to influence that choice. Of course, students must make their own career choices, but we should recognize that we, along with others, do influence that choice. Moreover, our view of education should be broad enough to include important life decisions of students as something that is within the province of educators. We do intentionally or inadvertently influence career decisions by whom we present to students as models of career persons (how are women and men portrayed in science textbooks?), by whom we encourage to enter science fairs or take on special projects, and by formal or informal advice we give about what courses to take. Sometimes our course content includes a description of adult female and male roles that implies a person should behave as parent, spouse, or bread winner in certain ways because of his or her sex.[2]

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[2]See, for example, "Group Structure Based on Sex Differences" in the first edition of the BSCS Blue Version, *Biological Science: Molecules to Man* by Biological Sciences Curriculum Study, Houghton Mifflin Co., Boston, 1963, p.620.

We do and ought to influence career choices of students. As we exercise that influence over choice, we should make certain that we open, rather than close, career doors for our students. However, let us remember that we are but one influence on our students. We will not single-handedly undo eighteen years of socialization, nor will we directly shape a career decision. We can only nudge, raise questions, and provide advice and resources.

Career decisions are not and should not be made in a vacuum separate from other life decisions. Decisions must also be made about marrying, having children, locating in a geographical area, helping with community needs, and so forth. Since all these decisions are closely tied to career decisions, we cannot narrowly confine career advising to providing information about available careers. Certainly providing career information is an important task, and talented women students increasingly recognize that many career options are opening to them and desire career information, upon which they can, in part, base a career decision. However, giving students brochures about science careers alone is not sufficient career counseling.

A career selection is not a "one shot" effort, but rather a process that continues, sometimes for a lifetime. Neither we nor our students should expect that making a career selection is like turning on a light. Reading a book, visiting a professional, or examining one's capabilities and aspirations will not automatically lead to a final career decision, but each of these activities may help students hypothesize that a certain career area is for them and help them to act on that hypothesis.

We are not prevented from career exploration activities with our male students; and certainly many high school and college male students would profit from career exploration. However, since women students face some unique problems (e.g., perceived role conflict among parent, spouse, and career person, unwillingness to make life plans, and other problems outlined in Chapter II), women especially can profit from the kind of career exploration suggested in this book. Further, in the mixed group of men and women, the roles of each are often so narrowly defined that it is difficult, if not impossible, for the women and men to consider new life options. We suggest that these activities be conducted in single sex groups, at least initially. After each group has dealt with the questions raised in these modules, then you may consider a mixed group.

Sources of Conflict in Females at Adolescence

What Does It Mean to Be Female?

Right now in the United States being female means a lot of things. It means wearing pink as a baby and later on baking cookies with mom. It means taking home economics instead of shop, and being a cheerleader instead of a football player. It means trying to decide on a career and find a husband while at the same time satisfying achievement drives.

For most young women, it means being underutilized in low status careers with limited opportunities and low job security most of their adult lives. In 1973 the median annual earnings of men who worked full time year round were $11,186. That same year the median annual earnings of women who worked full time year round were $6,335, or 56 percent of the male median. The single greatest factor causing this disparity was the tendency for women to be working in low paying, low status jobs with little potential for advancement.

The socialization of the female and its effects on career choices has been well documented. What it means to be female and make intelligent career choices is complicated by parallel sex role and identity development. The female's socialization process contributes to the narrowing of her career choices and the underutilization of her potential. As we know, women are concentrated primarily in the low paying fields where status, pay, and potential for advancement are the most restricted. In 1970 half of all working women could be found in only seventeen occupations, chiefly as secretaries, retail sales clerks, bookkeepers, wait-

resses, and public elementary school teachers. To account for half of the male workers in that year one would have had to combine the totals from sixty-three different occupational groupings. Talent of women is seriously underutilized, a waste to them and a loss to society. Women who stay in the labor market continuously earn only two-thirds of the amount earned by men in the same occupation.

Lower job status for women is accompanied by greater rates of unemployment. Whereas men had a 4.9% rate of unemployment in 1972, women experienced an unemployment rate of 6.6%. This higher rate of unemployment for women has continued to date, despite litigation and legislation since 1972 that has been aimed at improving the situation. In other words, with the current pattern of employment and with the large number of women entering the labor market, women as a group are suffering both in earnings and job security. They are getting less of a return on their investment in education both in terms of status and in terms of income.

On the other hand, women who have been able to break out of traditionally female occupations have been able to achieve greater job security and higher status. The cumulative implication of these data is that women can and should raise their vocational sights, broaden their horizons, increase their awareness of what lies ahead in the job market, and broaden their vision of what is possible for them.

To many individuals the data on the employment pattern of women indicate that women lack the motivation to achieve. However, Matina Horner (1969, 1970) and the work of Maccoby & Jacklin (1974) demonstrated that women do have high motivation to achieve. Yet we know that women underachieve and are under-represented in many occupations, especially in math and science-related careers. When we study the achievement motives of high school and college women, we must keep in mind that sex role identity and sex role conflict are crucially relevant variables. If we turn to the studies of achievement motives and behavior, we know that females have high achievement orientation but at the same time have accompanying higher anxiety scores. These anxiety scores are directly related to concerns over the consequences of being successful, especially in a male-dominated field. This anxiety is expressed as concern over the assumed loss of femininity. Being feminine and pursuing male-oriented fields is often perceived as incongruent. Margaret Mead has suggested that in our culture boys are unsexed by failure and girls by success.

A successful career choice is related to a choice that carries a potential to be rewarding, that is compatible with one's own skills and abilities, and that utilizes one's potential and is integrated in one's identity and life style. Much of the work of Maccoby and Jacklin in *The Psychology of Sex Differences* indicates the behavior and development of the sexes are very similar during the first ten years of life. In these early

years, females appear to have a slight advantage over males because of their early developmental precocity. Yet, we find that adult females have low status jobs and contribute less to professions and are less likely to be in certain career areas. So the question arises, how and when do the very real differences in adult personalities appear? Although we read and know that many of the causes of the differences begin in childhood, the real precipitating factors generally occur in adolescence. It seems as if suddenly, and generally without any real apparent reason, culture dictates that achievement and femininity are incompatible.

The following pages will demonstrate how and why anxiety over achievement interferes with making a successful career choice. Women are able to successfully compete in the masculine occupational world to the extent that they can bring personal qualities to the role. The extent to which they can do this is dependent upon how well they have resolved the inner conflicts between desire to achieve and the desire to be feminine. These conflicts are real and are tied to each girl's concept of herself.

We will examine the development of one's sense of self, the pervasive sex role expectations, and the integration of these two developmental processes and their relationship to career choice. We will demonstrate why women students need special kinds of interventions, such as the activities suggested in Chapter III, to assure full and free choice of all career possibilities.

Feminine Identity and Career Choices Psychological Barriers

A person's self concept is a point of stability and a frame of reference, the main organizing principle available in dealing with the world. The self is a source of action, of motivation, of direction. How a person values self determines the level of self esteem and directly affects achievement. Women who act on and use their various skills and attributes are likely to have high feelings of self esteem. Women who defensively utilize only certain aspects of their potential are likely to have low levels of self esteem. The lower the self esteem, the greater the anxiety and the greater the response to pressures to assume a prescribed role. It is only with high self esteem that one is free to reject the roles of society and to develop skills within one's own frame or sense of self. The woman is faced with the choice of devaluing self and giving into role expectations entirely, allowing external evaluation and relationships to determine her life plan, or integrating feminine identity and societal expectations into a healthy sense of self and direction.

Development of identity in a pre-teenager depends on many factors and is an aggregate of *discovery* in reference to self. Gradually, the sense

of identity becomes a fuller and richer establishment. In developing their identity, young girls feel caught in a situation in which two equally important systems of value are in conflict. *One* system is the desire for positive sense of self, the sense that one is a worthwhile, productive person, the sense that one is fulfilling, that one is able to act on one's interests and abilities. Achieving, getting good grades, excelling, has been both encouraged and rewarded so far for this young girl. So why would it not be a productive, major avenue for establishing self, the self as a worthwhile and valuable human? A competing reward system appears at the period of adolescence. The competing system is a desire to be a good female, to conform to the sex role expectations, to be feminine, to be liked by boys, to be popular, to be pretty, to date a lot, to be well groomed, to have a nice personality, and to be successful interpersonally. Horner (1969, 1970) argues that measures of achievement motivation, often do not reflect the major conflict situation that particularly affects young women, namely that they feel it is acceptable, indeed expected, to do well in school but at the same time, it is unladylike to beat men at any task or to be too successful. This conflict produces a situation in which a woman wants to succeed but not too much, and also, not in the areas that are traditionally male. These desires help keep women—no matter what their level of ability—out of traditionally male fields, such as science. The desire to be a worthwhile, competent person fulfilling one's own potential is often incompatible with the desire to be a successful female.

These two conflicting value systems produce a situation in which women want to succeed, but not too much, and success should be achieved in areas which are not traditionally male, since success in these areas implies competition with the boys. In addition, if one is successful, there are negative consequences attached to this success—a loss of femininity, a loss of attractiveness, a loss of reward for being feminine. A study by Monahan, Kuhn, and Shaver (1974) indicates that adolescents of both sexes give more negative responses to stories about successful girls than about successful boys. Both boys and girls are negative about the consequences of success for females. Subjects of both sexes are equally positive about male success. There is a great deal of peer feeling from both boys and girls that success and femininity are incompatible. The incompatibility of success and femininity is reinforced by adults (Broverman, 1968).

The preparation for the female adulthood, thus, is carried out in a context of conflict between the success value system and the femininity value system. Achievement is no longer unquestionably rewarding, as it was when she was younger. Femininity is demanded. Achievement and femininity are seen as desirable, but incompatible. Anxiety arises and the double bind situation creates ambivalence toward major life decisions.

As we have indicated earlier, the personality development is quite similar in both sexes during infancy to childhood, but adolescence really represents a major divergence. It is important to point out that there is a difference between boys and girls in their career development paths. The self-esteem of most men is closely tied to their vocational achievements. For women, this tie is not as obvious.

For the male, the search for adult identity means integrating interests with a career role in life. For the adolescent girl, this process is considerably different. She does not anticipate that work outside the home will be the major source of identity. Even in these days of comparative liberation, our interviews with high school seniors (Smith, Stroup, 1975) indicate that many females see themselves working only until they get married, or until they get married, and then again when the children are grown. Our experience with college women indicates that many are preparing themselves to be elementary teachers or social workers, not because they want to educate minds of youth or do works for humanity, but rather they want to have something to fall back on or they simply have to have a reply when aksed, "What's your major?" Job identification is simply not a major source of identity nor is it integrated in such a way that it can be.

For the adolescent male, the search for adult identity means that he integrates his interests into his adult roles. Success and masculinity are compatible. In fact, the question that these two value systems may be incompatible never arises. Boys do indeed have to make major life decisions, but these decisions are not made in the milieu of anxiety over a conflict between achievement and masculinity. While the male is actively striving to develop and integrate his career identity with the rest of his sense of self, the female is postponing her career identity.

Sex Role Conflict and Career Choices
The Sociological Barriers

The learning of adult sex roles is seen primarily as occupationally-directed for males and family-directed for females. In adolescence, identity formation is a key process, but the contingencies are such that for many women self identification may not occur at this stage and may be postponed for a later search. Shirley Angrist (1969) uses the term contingency training to describe this phenomenon. Flexibility is built into women's personalities by the socialization process. Young girls learn early that they must remain malleable enough to fit the value system of their potential future spouse. The unknown qualities of the future—the husband, the uncertainty of marriage, the potential husband's characteristics, the possibility of economic necessity of work, the

possibility of childlessness, children leaving home, divorce, widowhood, etc.—oftentimes prolong the job identification process. Women live by adjusting to and preparing for anticipated potentialities over which they feel they have relatively little control.

Why plan a career when these other "more important," but *unknown* questions remain unanswered and apparently outside the woman's control? Four sets of contingency questions loom large for the young woman and the lack of answers to varying degrees paralyzes her ability to make decisions about herself and her future.

1. Will I get married? When? To whom?
2. Regardless of whether I marry, will I need to support myself and/or my family financially?
3. Will I have children? When? What effect will they have on my life? What happens to me when they leave home?
4. If I do marry, will something happen to my husband—divorce, death, separation? What happens to me then?

These are real questions and are seen as real by many young girls; others have a romantic view of their future and do not recognize the contingencies.

How do I take care of my young children and work fulltime at a career? How do I fit the need to be mobile in a science career and yet not conflict with my future husband's career? These questions need to be dealt with directly. The confrontation of these contingencies and their relationships to career choices needs to be a part of career exploring and development. Many times, solutions are more apparent than one realizes and the examination of role models who have actually combined these areas make it easier for the young women to plan for these contingencies.

The Problem: Integration of Identity with Roles

An important developmental task is the integration of personal identity with expected roles. It involves a search for personal identity and at the same time pressure to integrate societal roles. This task might best be pointed out by giving an example.

A seventeen year old girl may very well enjoy and derive intrinsic gratification from active sports and the thrill of scientific discovery. For her these activities are very important components of her personal identity. It seems logical to continue to improve these abilities which interest her. All about her she hears the message that one should strive to be successful at whatever one does well. She should use her talents. Parents and others stress good grades and high achievement. The girl

feels positive about such achievements.

At the same time she may be receiving extrinsic rewards for behaviors that conform to female role expectations of the seventeen year old. Her friends may be making a great deal of boys and their pursuit of them. She may worry about beating boys on the playing field or in the classroom, or outperforming them by comparison. Her parents may expect her to improve her homemaking skills at the expense of other areas. Her friends and family may expect her to be more careful in appearance and demure in her behavior.

In this situation, how will this seventeen year old reconcile the competing messages she is receiving?

One of the critical processes of this time is to match personal identity with role expectations. One of the ways in which these things are matched or made congruent is in the process of occupational choice. For example, a boy who experiences the intrinsic gratification of the thrill of scientific discovery may begin studying hard and preparing himself for a successful career. For the male student intrinsic gratification and what people reward him for in society are fairly congruent. The girl, on the other hand, who gets intrinsic gratification from active sports or scientific discovery has a more difficult time integrating her goals and societal role expectations with occupational choice. In other words, it may be very difficult for her to choose a career that is congruent with *both* her personal identity and role expectations. So at this age, this kind of adjustment problem (the working through process) is very critical for the young woman. Sharing feelings with peers and with teachers is very important. Working through what will happen to her and what she is experiencing is important.

In these situations, how will the seventeen year old make plans and prepare for her own future?

The interaction between search for identity, the uncertainty about self, and the very strong pressure to conform to sex role stereotypes makes it very difficult for the woman student. The incongruence of these two forces adds to the difficulties. A young woman may, and often does, accommodate these conflicts by giving in and fitting into the "traditional female roles," but this accommodation is paid for by giving up a sense of self worth and achievement. That is why systematic intervention at this particular stage is so very important. The young woman must work through these questions as she acquires her adult identity, but the contingency nature of these questions requires that she put off finding answers. Additionally, she must accomplish this task, not in a vacuum, but in relation to parents, friends, teachers, and other interested adults who may be giving her competing messages about what's appropriate for her. The integration must come from an awareness of one's self and one's strengths, and the discussion of the pressure to conform—all in a supportive climate.

Supportive Environment: The Role of the Teacher in Career Development

What others think of a woman's plans and how these thoughts are communicated to a woman are quite significant factors in a woman's consideration of actual pursuit of a non-traditional career. The supportive environment has been found to be essential to the development of the woman scientist. Barbara Miller Solomon ("Women in Science," 1975), speaking at a conference on successful women in science convened by the New York Academy of Science in 1972, formalized the need this way. "Women's expectations have grown because some people and some institutions have believed in them. Whether during childhood, school-days, college, graduate or professional years, these women have had special encouragement from one or more people: father, mother, teacher, friends, or professional colleagues." This particular statement demonstrates how very important the interactions between teacher and women students can be, if talented women are to pursue science careers.

Much of the discouragement toward certain careers felt by women is discouragement by default, that is, a lack of encouragement or support from friends, teachers, and parents. Many times the lack of recognition or encouragement from significant others affects a woman's conclusion about whether or not she has the ability in a particular field. She may have the ability to pursue, for example, engineering, and her friends, parents, and teachers may not actively oppose this career for her; but if nothing in her environment is giving her the message that engineering is okay and that, indeed, she has the necessary talent for that field, then she very likely will not affirm her own ability and will be discouraged by default from seriously considering that career.

In fact, evidence indicates that discouragement by others has far more effect on the career decisions of women than of men. Luchins (1976) asked females and males what people or factors had discouraged or hampered their decision to be a mathematician. More women than men felt that they had been discouraged by family and friends; and nearly three times as many women as men felt that they had been discouraged by their teachers. When asked in what way they felt discouraged, many said the teacher expected less of them, the teacher paid attention only to the boys, the advisor asked why they weren't home having babies, etc. Even more striking are some results that indicated perceived differential treatment for girls and boys. Eighty percent of the women, but only nine percent of the men, reported that they had encountered such differential treatment. Whether or not that treatment indeed had been different is secondary; the important thing to note is that many women, and few men, perceived their treatment as different from that accorded the opposite sex. These results provide additional

rationale for overcoming these perceptions through special attention given by the science teacher or counselor to young women who might possibly be interested and talented in science, technology, or mathematics careers.

Barbara Kirk (1975) questioned women about what kinds of interventions had increased or encouraged interest in science. Activities related to science courses, grades in those courses, and science teachers, in addition to their own interest prior to the courses, were listed by women as important factors encouraging them to be interested in science. Once again teachers were shown to be an important dimension in choice-making. When the question was asked in reverse, "What kinds of things decreased or discouraged your interest in science?" discouraging factors included the content of the courses and grades received in the courses, but not the teacher *per se*. These responses indicated that teachers were perceived to have more positive than negative influence. When asked the question in another way, "Overall, what experiences of any kind have you had that tended to encourage you toward science and mathematics?" the areas with the highest percentages were instruction, teachers, classes, being successful and doing well, and work experience and opportunities. Again, one's own interests and success in factors related to educational experience seem to be most frequently mentioned. Teachers can positively influence their talented women students to choose science-related careers.

In another part of Kirk's study, women were asked what they most wanted to know about careers. The items listed most often in order were (1) the kind of life a person in the career is likely to have, including hours worked, working conditions, and possibility of travel, (2) required education and training, and (3) skills and interests needed in various jobs. Life-style orientation involved in particular careers was very important to women students. They desired to know if the life-style would mesh with their goals as wife and mother, both of which are contingent factors. Since life-style is very important in thinking about future plans, an examination of life-style must be done parallel to a woman's examination of her abilities and interests as she explores her career possibilities.

Talented young women are open to influence in their thinking about careers in high school or college. Approximately one third of high school women state that they are considering careers in which science or mathematics ability plays some part and only fifteen percent have actually eliminated science-related and mathematics-related careers from any consideration. Thus, with the known instability of career choice for people of this age, intervention in the high school or college years can have an effect on career choice. In fact, our evidence (Smith, 1976) indicates that career exploration activities of the kind described in Chapter III can significantly increase the proportion of talented

women who decide to pursue a science-related career in college.

Any program that involves career development for women must face certain realities. Questions related to sex role identity and the perceived success-femininity conflict, as well as the contingency training questions, must be confronted as an integral part of inducing wider career options for young women. Activities in Chapter III include self-awareness components, exposure to role models, and integration of identity with career choice as means to encourage freer and more open career choices that are commensurate with abilities and skills of talented young women.

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Smith, W., K. Stroup, *Career Exploration Project for High School Women*, Final Report, National Science Foundation Grant GY11322. Emily Taylor Resource and Career Center, University of Kansas, Lawrence, Kansas, 1975.

Smith, W. "Science Education in the Affective Domain: The Effect of a Self-Awareness Treatment on Career Choice of Talented High School Women." Paper presented at national convention of National Associaton for Research in Science Teaching, San Francisco, April, 1976. (ERIC document Reproduction Service, No. Ed128168)

Trotter, R.J. "Sexism is Depressing." *Science News*, Vol. 108, Sept. 13, 1975, pp. 173-174.

The Vocational Preparation of Women, A report of the Secretary's Advisory Committee on the Rights and Responsibilities of Women. Department of Health, Education, and Welfare, Washington, D.C., 1975.

"Women in Science." *Mosaic*, Vol. 6, November, December, 1975, NS.29: pp. 8-13.

Helping Females Explore Science Careers

Talented high school and undergraduate college women students can benefit from various kinds of career exploration activities. Science teachers, perhaps working jointly with counselors, occupy a unique position to assist their talented women students to consider the pursuit of a professional, science-related career. The career exploration activities which a teacher and/or counselor might provide for students will vary greatly depending on several factors—opportunities to provide the activities, skills of the particular teacher or counselor, and commitment of each to the process.

As the implementation the use of these career exploration activities will vary, the activities have been divided into independent modules to provide maximum flexibility to the user. Each module may be used as is; selected activities may be extracted and used; or several modules may be put together. The introduction to each module states the module's objective and provides an overview as well as suggestions for how the module might be used independently or in conjunction with other modules.

Some modules require careful organization and preparation by the leader. For example, the module, "What's It like to be a Professional Woman in a Science Career?," which brings students in contact with women professionals, requires arranging interviews or group discussions with the role models. On the other hand, other modules, such as "Turning a Girl Onto Science Careers," can be used very informally. For example, it could be given to a school librarian to order biographies

of women scientists, or the teacher could order appropriate pamphlets for a "Career Corner" in the classroom.

The point here is that although these modules could be organized into a formal, year long or semester long course, the modules can be adapted to the individual requirements of each teacher or counselor. You are encouraged to do so and also to communicate your revisions, adaptations and additions to the authors, so that these activities might be improved upon for future use.

The first module, "Turning A Girl Onto Science Careers," is intended for use with your women students whom you can identify as having talent in science, and who may or may not have indicated an interest in a science career. Much of the module revolves around resource lists of books, pamphlets, articles, films, and other media material which describe women and science careers or relate the life of a particularly outstanding woman scientist. We hope that, at the minimum, all science teachers would choose to use this module.

"What Do I Want Out Of Life?," the second module, contains activities which are not unique to science. The purpose of this module is to put the cart and horse of career selection into proper order. All too often a student (or an adult, for that matter) chooses a career because of interest in the area and presumed availability of jobs. Once embarked in the career or in preparation for the career, the student then realizes the implications of the career on his or her life style. This module attempts to reverse the order of the process by encouraging students first to analyze their own abilities and to decide what kind of life they want to lead, and second, to choose a career based on their abilities and desired life style. Since this module involves activities not usually considered within the province of classroom teachers, the science teacher may be more comfortable seeking the assistance of a counselor with this module.

Women particularly report that their career decisions are influenced by opinions and attitudes of their parents and same sex or opposite sex friends. The third module, "How Do Parents And Friends Affect A Woman's Career Choice?," contains activities in which the student studies the influence process in the abstract and then explores her own situation in relation to her parents and friends. The module is aimed at clarifying this important factor in career selection and pursuit process, so that the woman student can better deal with and put into perspective the influence of significant others.

The fourth module, "What Careers Are Available?," outlines activities which independently are insufficient for an informed, appropriate career decision, but which all too often constitute the only career exploration we provide students. This module requires students to zero in on specific careers so that they might become knowledgeable about the career they are considering. We advocate using this module only

after students have examined their abilities and desired life-style, but it can be used independently of the other modules.

In an ideal world (from the point of view of the authors) no distinctions would be made between male and female professional people. There would not be male engineers and female engineers, but only engineers. There would only be science teachers and not female and male science teachers. However, that ideal world does not exist either in fact or in the minds of our students. A woman student considering a professional, science-related career has many concerns different from her male peers. Therefore, we have included a fifth module on "What's It Like To Be A Professional Woman In A Science Career?" In these activities, students visit professional women to discuss their work, their relationships with colleagues and supervisors, their balancing of work and home life, and other facets of life as women professionals.

When a woman student has selected a professional, science-related career, the task becomes one of planning the necessary education and experience to reach the career goal. This is the aim of the final module, "OK, I'm Sold On Trying A Science Career, But How Do I Get From Here To There?" Students figure out what credentials they will need for an entry job in their career area, and then formulate a plan of action to achieve their goal.

Module A
"Turning A Girl Onto Science Careers"

Objective—It may be true that you can lead a horse to water, but you can't make it drink; however, it's also true that the horse can't drink the water before it finds the watering trough. Likewise, your talented women students may not even consider a professional, science-related career unless you make the message quite plain. "Hey, a woman *can* be a doctor, engineer, science teacher, researcher, or dentist. Others have done it. It's exciting! I really could be a scientist!" We rarely do what we've never imagined ourselves doing, and that's no less true of careers. Your women students have to find out what careers are available and that it's possible for them to pursue a professional, science-related career.

Look through your textbooks. Check out the list of physicians and dentists in the telephone directory. Watch your TV, both your favorite shows and the shows your students are watching. Just how are scientists portrayed? When we asked ninety elementary students to answer that question by drawing a picture of a scientist, all but a half dozen drew a male scientist. Those children eloquently answered the question; with some notable exceptions, scientists are portrayed as men.

In the face of that preponderence of male images, how can a woman be reasonably expected to think of herself as a scientist? The purpose of this module is to rectify that situation by showing talented students that women can indeed be scientists, and that, in fact, many significant contributions have been made by women.

Activities—You will want to select from among these activities. We have listed a number of resources in hopes that some of them will be readily available to you.

How you deliver these activities is up to you. You may show a movie to your class. You may give a pamphlet to talented students. You may gather a select group of students for an after school slide-tape show and discussion. You may sponsor a career day and make certain that women in science careers are included. You may suggest to an English teacher that some particular biographies be included in a book report assignment. You may give one of these lists to a librarian so that some of these books may be included on the library shelves. You may ask students to make a report to your class about the life of a scientist. You may make certain that your counselor has some of these materials available. You may encounter a student in the hallway and suggest, "Hey, I thought you might want to look at this." You may casually leave pamphlets on a desk in the lab.

We have found it most effective to present attractive, young, women in science careers to our students either in person or in the media. While it's important that our students become aware of notable women like Maria Mitchell, Ruth Benedict, and Elizabeth Blackwell, it is more important that our students are presented role models with whom they can more clearly identify.

Activity One
Pamphlets about Women and Science Careers

Several brochures and short books about women and science careers are inexpensively available and can be easily put in the hands of students to whet their appetite. Select some items from the following list for your classroom, library, or career center. The first item from ACT is a "must." In almost every case, items on this list deal with women and science careers; but dozens of brochures about science careers are also available. NSTA's *Keys to Careers in Science and Technology* and the *Occupational Outlook Handbook* are very useful for identifying many sources of these brochures.

1. American College Testing Program. *Women in Science and Technology: Careers and Today and Tomorrow.* ACT Publication, Iowa City, Iowa, 52240. 1976. Single copies $1.50, but bulk rates available. This booklet is the one best resource to demonstrate to students that women are successfully engaged in the wide range of exciting, professional, science-related careers.
2. Krienberg, Nancy. *I'm Madly in Love with Electricity and Other Comments About Their Work by Women in Science and Engineering.* Lawrence Hall of Science, University of California, Berkeley, California, 94720, Attn: Careers. 1977. $1.00 From the vividly bright cover, through firsthand accounts of their jobs, to a helpful bibliography, we are impressed by *I'm Madly in Love....* Excerpts from questionnaires are woven together to provide a mosaic description of careers in engineering, mathematics, physics, astronomy, chemistry, and life sciences. The enthusiasm of these women for their work is infectious. While this booklet is highly recommended for use around the country, people in California will also profit from the listing of dozens of West Coast women who can serve as resource people and role models in these careers. (And we hope that based on this model publication, people from other areas will produce and distribute their own lists of local resource people.)
3. Neustadtl, Sara Jane. *Women Engineers.* Engineers' Council for Professional Development, 345 E. 47th St., New York, N.Y. 10017. 1974. Quickly describes opportunities for women in engineering. Highly recommended.

The Society of Women Engineers, 345 E. 47th St., New York, N.Y., 10017, can provide the following articles about women in engineering:

"The Distaff Engineer," reprinted from *Automation*, May 1974.

"Career Options—This Engineer's Course," reprinted from *Design News*, July 22, 1974.

"The Ms. Factor," reprinted from *Mechanical Engineering*, July 1973.

Society of Women Engineers Achievement Awards, 1952-1974. Short biographical sketches of award winners.

"Wanted: More Women Engineers in Agricultural Engineering," reprinted from *Agricultural Engineering*, 1970.

Women in Engineering. Role Models from Henniker III. 1973. Short biographies of girls who became engineers.

"A Profile of the Woman Engineer." 1972.

Engineering Manpower Bulletin: Women in Engineering, May 1972, $1.50.

McAfee, Naomi, "Women in Engineering," reprinted from *New Engineer*, March 1973.

4. American Medical Women's Association, Inc. *Career Choices for Women in Medicine*, 1790 Broadway, New York, N.Y., 10019.

5. U.S. Department of Labor, Manpower Administration, and U.S. Department of Health, Education, and Welfare, National Institute of Health. *Health Career Guidebook*. Superintendent of Documents, U.S. Government Printing Office, Washington, D.C., 20402. Stock Number 2900-0158. Third Edition, 1972. $2.25.
   Although not written specifically for women, this book provides a comprehensive overview of 34 health careers, describing available jobs, qualifications, related jobs, employment outlook, and sources of additional information. Updated periodically.

6. U.S. Department of Labor, Bureau of Labor Statistics. *Occupational Outlook Handbook, 1976-77 Edition*. Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402. Stock Number 029-001-01406-6. $7.00.
   Frequently revised and updated, this book of nearly 800 pages describes approximately 400 career areas from air traffic controller to welder. An effort has been made in recent editions to remove sexual biases from the text and pictures.

7. Campbell, Margaret A. *Why Should a Girl Go Into Medicine? Medical Education in the United States: A Guide for Women*. The Feminist Press, Old Westbury, New York, 1976.
   This book focuses on the experiences of women in medical school rather than on describing medicine as a career, but your students can profit from learning what medical shcool is like.

8. Farnsworth, Marjorie W. *The Young Woman's Guide to an Academic*

Career, Richards Rosen Press, New York, N.Y. 1974.
Dr. Fransworth, a university scientist, informs women of the perils and rewards of an academic career, both in graduate training and in a univeristy position. Recommended for your special students who are thinking ahead to college research and training positions.

9. Morse, William B. *Anne Webb, Girl Forester.* Reprinted from *American Forests*, April 1965, and available from Society of American Foresters, 1010 16th St., N.W., Washington, D.C. 20036.
Straightforward story of a woman training to be a forester.
10. U.S. Department of Agriculture, Forest Service, *Women in the Forest Service.* Superintendent of Documents, U.S. Government Printing Office, Washington, D.C., 20402. 1972.
Decribes a wide variety of forest service careers.
11. "Women and Minorities in Chemistry '75," *Chemical and Engineering News*, October 7, 1974, pp. 34-36. Reprints available from American Chemical Society, 1155 16th St., N.W., Washington, D.C. 20036.
12. *Science Education For You?* National Science Teachers Association, 1742 Connecticut Avenue, N.W., Washington, D.C., 20009. Stock number 471-14688, 1975. $.50.
Describes the many kinds of positions in science education and helps students consider this career area.
13. Grimm, Sandra D. *Keys to Careers in Science and Technology.* National Science Teachers Association, 1742 Connecticut Avenue, N.W., Washington, D.C., 20009. Stock number 471-14660. 1973. $1.00.
A comprehensive bibliography of career literature across the broad range of science-related careers. While many professional associations, universities and commercial publishers are attempting to improve their literature to include women and men in non-technical jobs, you should screen materials to make sure you are presenting a balanced picture to your students. In many instances the career literature is provided free or at very minimal cost.
14. U.S. Department of Labor, Women's Bureau, produces many brochures, fact sheets, and books about women and careers. Contact you regional Women's Bureau (check library for address) or write U.S. Department of Labor, Women's Bureau, 200 Constitution Ave., N.W., Washington, D.C., 20210.
Ask for their free list of publications, then choose what you need.
15. Catalyst, 14 E. 60th Street, New York, N.Y., 10022, has produced much good information about careers for women. Many of their publications focus on mature women returning to the work force, but some publications, such as *Engineering Career Opportunities and Psychology Career Opportunities*, are aimed at young women. Write for a price list. Their materials are well worth the cost.

16. *Science World*, a weekly magazine for high school students about science, often has articles about science-related careers and frequently these articles feature women in science careers. Write Scholastic Book Services, 50 W. 44th Street, New York, N.Y., 10036, for subscription information.

Activity Two
Audio Visuals About Women and Science Careers

Several media products, both films and slide tape programs, have been prepared to show women in their professional, science-related careers and also to show these women in activities outside their jobs. These media products demonstrate both that women can pursue a science career and that women scientists can also enjoy a full, rich adult life as career person, parent, spouse, and community member, and that, furthermore, their personal lives are truly satisfying. You can use these media materials with your science class, so that both male and female students can view the message. However, you should also plan to gather your talented women students (from your classes, your school, or from a wider geographical area) for their own private viewing. This latter setting, we have found, removes many of the group pressures that exist in the more heterogeneous setting.

A World For Women in Engineering. 16mm color movie or videotape. 20 minutes. Free from your local Bell Telephone, 1976. Inquire at Business Office. Also available on a long term lease basis.
Superb. Five young women are shown in various engineering careers and in their private lives.

Women's Work: Engineering. 16mm color movie or videotape. 26 minutes. 1975. Rental $25 or Purchase $245 from Massachusetts Institute of Technology, Center for Advanced Engineering Study, Cambridge, Massachusetts, 02139.
Excellent documentary film designed to motivate young women to consider careers in engineering. Shows young women in engineering school and on the job; has several interesting sequences regarding the responsibilities of marriage and raising children.

Women in Science by Dinah Moche. Slide/cassette tape and articles. 1975. Purchase $27.50 from National Science Teachers Association, 1742 Connecticut Ave., N.W., Washington, D.C., 20009.
Excellent series of six taped interviews of successful and interesting women in a broad range of science careers, including biophy-

sics, environmental engineering, astronomy, nuclear physics, and endocrinology. Tapes are accompanied by 35mm slides and article. Could be used in special career program or when a related topic is studied in class.

Career Posters. Write Ms. Linda Vaughan, Educational Communications, General Electric Company, Fairfield, Connecticut, 06431. Free to teachers. Continually updated.

Attractive color posters show young women and men who are considering a wide variety of careers based on their interests. A short essay is included in each poster. For example, a young black woman is shown trying to assemble a three dimensional puzzle and the essay suggests she might apply that interest in an engineering career. Another poster shows a young man who enjoys cooking; and careers as a chef, dietician, or nutritionist are suggested for him. The series shows students with both "traditional" and "non-traditional" career interests. The posters are excellent for classroom display.

As we teach our usual topics in our science courses, we can include topical movies which show women in science-related careers. The following movies represent this kind of media:

Miss Goodall and The Wild Chimpanzees. 16mm color film. 28 minutes, 1976. Free from Aetna Life and Casualty, Public Relations and Advertising Department, Film Library, 151 Farmington Ave., Hartford, Connecticut, 06115.

This film and others in the Goodall series, are excellent for biology units on animal behavior. While dealing with subject matter, you also show a woman doing exciting work in science. Several other classic nature films from the Goodall series are available, for rent or purchase, from Films, Inc., New York, N.Y., 10016. (312) 676-1088.

Margaret Mead. 16mm black and white. 30 minutes. 1960. Rental $11. University of California Extension Center, Berkeley, California, 94720. Order #6930.

Celebrated anthropologist discusses contemporary problems, bringing to bare her experiences with primitive societies. Appropriate for biology unit on society.

What is a Woman? 16mm black and white. 30 minutes. Rental $13. University of California Extension Medical Center, Berkeley, California, 94720. Margaret Mead and Keith Berwick discuss what is feminine and masculine.

Margaret Sanger. 16mm black and white. 15 minutes. Rental $7.50. Contemporary Films, Inc., 267 W. 25th St., New York, N.Y., 10001.

Documentary story of the efforts to bring benefits of family plan-

ning to the women of America and the world. Appropriate to show that women have contributed significantly in public health careers.

Woman Doctor in Vietnam. 16mm black and white. 26 minutes. CCM Films, Inc., 866 Third Avenue, New York, N.Y., 10022. Ask for price.

Story of Dr. Pat Smith of Seattle who runs a hospital in Vietnam.

Activity Three
The Story of Women Scientists

Make a mental list of women who have made contributions in science. We have asked many groups to do just that and our results show that you shouldn't be embarrassed if you could get no farther than Madame Curie. Perhaps you also listed Margaret Mead, Rachel Carson, Margaret Sanger and maybe even a few others. However, your list probably wasn't nearly as long as a list of male scientists would have been.

Several reasons contribute to our inability to list women scientists. First of all, science hasn't been considered "women's work," so fewer women have worked in the science area. Second, among those women who have entered the world of science, many have congregated in less prestigious careers—such as public health, nutrition, and social sciences—which don't make headlines in newspapers or history books. Third, many women scientists have been relegated to assistant roles as women have traditionally been in many areas. "Behind every successful man there's a woman" is often no less true in the laboratory than in marriage. Fourth, some truly outstanding contributions have not been recognized. For example, we're all familiar with Watson's and Crick's monumental work on DNA's structure, but few remember the work of Rosalind Franklin in X-ray crystallography that added important clues to the Watson-Crick model. Fifth, the increasingly greater numbers of women entering professional, science-related careers in recent years have not yet reached the point in their professional careers where they are considered as the "Big Names" who become household words.

However, many women have "made it," and we and our talented women students can profit from reading about their lives. Suggest this list to the librarian and English teacher. Suggest that these books be prominently displayed and recommended to talented women. Articles and essays can be reproduced for use in your classroom. Scientific "*Her*story" does exist and can give confidence to your students. Although the following list is limited to material about women in science, your students could also profit from biographies of outstanding women in all walks of life. D.S. Rosenfelt's 1976 bibliography, *Strong Women*

(Feminist Press, Box 334, Old Westbury, New York, 11568), describes many books, including biographies and autobiographies, about interesting women like Maya Angelou, Shirley Chisholm, Anne Frank, Shirley MacLaine, and Virginia Woolf. Agnes Kadar and Barbara Shupe ("Science: A History of Women's Work," *Science Teacher*, Vol. 44, No. 4, April 1977, pp. 39-41) summarize important contributions of many women in science and include a very helpful bibliography which supplements the following.

1. Clark, Robert. *Ellen Swallow: The Woman Who Founded Ecology.* Follett Publishing Co., 1010 West Washington Blvd., Chicago, Illinois, 60607. 1973.
   At a time when we are so concerned about our environment, it is fascinating to learn how Ellen Swallow opened up this area of study.
2. Diamonstein, Barbaralee. *Open Secrets: Ninety-Four Women in Touch With Our Times.* The Viking Press, 625 Madison Avenue, New York, N.Y. 10022. 1972.
   Brief biographies of women in search of excellence in a variety of fields including cardiovascular surgery and conservation.
3. Emberlin, Diane. *Contributions of Women: Science.* Dillon Press, Inc., 500 South Third Street, Minneapolis, Minnesota, 55415. 1977. The scientific contributions and lives of six women, Annie Cannon (astronomy), Lillian Moller Gilbreth (engineering and scientific management), Margaret Mead (anthropology), Rachel Carson (ecology), Ruth Patrick (limnology; winner of the prestigious Tyler Ecology Award), and Eugenie Clark (icthyology) are each briefly described. While written for middle school age students, an older reader can appreciate this light reading. The *Contributions of Women* series contains nearly 20 titles from aviation to medicine to theater.
4. *Heritage Series #4: Women in Medicine.* Alpha Kappa Alpha Sorority, 5211 S. Greenwood Avenue, Chicago, Illinois, 60615. 1971. Twenty-six brief biographies of contemporary Black American women physicians in a variety of kinds of practices. You may be interested also in other Heritage Series volumes on Black American women in law, politics, and business.
5. Kundsin, Ruth B. *Women and Success: The Anatomy of Achievement.* William Morrow and Co., 105 Madison Avenue, New York, N.Y. 10016. 1974. Several essays, including 12 brief autobiographies of contemporary women scientists.
6. Lutzker, Edythe. *Women Gain a Place in Medicine.* McGraw-Hill Book Company, 1221 Avenue of the Americas, New York, 10020. 1969.
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7. Marks, Geoffrey and Beatty, William. *Women in White: Their Role as Doctors Through the Ages.* Charles Scribner's Sons, 597 5th Avenue, New York, N.Y. 10017. 1972.
Excellent history of women in the healing arts.
8. Mead, Margaret. *Blackberry Winter: My Earlier Years.* Pocket Book, 1 W. 39th St., New York, N.Y. 10018. 1972.
Autobiography of the great American anthropologist.
9. Merriam, Eve, ed. *Growing Up Female in America: Ten Lives.* Dell Publishing Co., 1 Dag Hammarskjold Plaza, New York, N.Y. 10017. 1971.
Ten American women, including the pioneering astronomer, Maria Mitchell, describe their lives.
10. Myers-Brown, Elizabeth, ed. *Successful American Women: Some Satisfying Careers.* Highlights for Children, 803 Church St., Honesdale, Pennsylvania, 18431. 1976.
Written for elementary aged children, this booklet can give your students a quick, simple biography of some pioneering women, including a physician, environmentalist, chemist, and astronomer.
11. Nathan, Dorothy. *Women of Courage.* Random House, 201 East 50th St., New York, N.Y. 10022. 1964.
Biographies of five American women, including Margaret Mead.
12. Osen, Lynn M. *Women in Mathematics.* The MIT Press, 28 Carleton St., Cambridge, Massachusetts, 02142. 1974.
Traces the impact of women on mathematical thought, an area too often considered only for men.
13. Phelan, Mary Kay. *Probing the Unknown: The Story of Dr. Florence Sabin.* Dell Publishing Co., 1 Dag Hammarskjold Plaza, New York, N.Y. 10017. 1976.
14. Ross, Pat, ed. *Young and Female: First Person Accounts of Turning Points in the Lives of Eight American Women.* Random House, 201 East 50th St., New York, N.Y. 10022. 1972.
Includes a mining engineer (Emily Hahn), a public health advocate (Margaret Sanger), and other exciting women. Highly recommended.
15. Sayre, Anne. *Rosalind Franklin and DNA.* W.W. Norton and Co., 500 Fifth Avenue, New York, N.Y. 10036. 1975
Biography of a woman whose work in X-ray crystallography provided important evidence on which Watson and Crick based their double helix theory of DNA's structure.
16. Schacher, Susan, ed. *Hypathia's Sisters: Biographies of Women Scientists—Past and Present.* Feminists Northwest, 5038 Nicklas Place, N.E., Seattle, Washington, 98105. Paperback, $2.00. 1976.
Contains 17 brief biographies of women scientists from Agnodice (Greek physician, circa 300 B.C.) to Jane Goodall (contemporary animal behaviorist) plus 23 sentence length citations of other

scientists. It's fascinating to learn that Beatrix Potter (creator of Peter Rabbit) studied and first hypothesized the symbiotic relationship of algae and fungi in lichen.

17. Sterling, Philip. *Sea and Earth: The Life of Rachel Carson.* Dell Publishing Co., 1 Dag Hammarskjold Plaza, New York, N.Y. 10017. 1970.
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18. Stern, Madelaine B. *We the Women: Career Firsts of Nineteenth Century Women.* Lenox Hill Publishing, 419 Park Ave., S., New York, N.Y. 10016. 1974.
Focuses on those women who broke new ground in a variety of areas including science and technology.
19. Yost, Edna. *American Women of Science.* J.B. Lippincott Co., East Washington Square, Philadelphia, Pennsylvania, 19105. 1955. (out of print; available at many libraries.)
Wide ranging biographies of women influential in science throughout the first half of the twentieth century.
20. Yost, Edna. *Women of Modern Science.* Dodd, Mead, and Co., 79 Madison Avenue, New York, N.Y. 10016. 1959. (out of print; available at many libraries.)
This book provides many biographies of women who have made important contributions in science.

Activity Four
You've Got Me Learning, So What's Available?

A later module outlines activities for your students to use to find out what science careers are available, but right now your students may be casually interested in a science career and need to get a little more information.

Every high school counseling office and perhaps every classroom with potentially college bound women should have available *I Can Be Anything: Careers and Colleges for Young Women* by Joyce Slayton Mitchell. Ninety-two career fields are described for the high school or college woman. Sources of information about the career and where to get training are listed. A paperback edition ($4.50; order item #219850) or a hard back editon ($6.50; order item #219851) is available from College Board Publication Orders, Box 2815, Princeton, New Jersey, 08540.

Activity Five
Role Models

One characteristic of outstanding women students is that they want

"The Facts." Knowing that many options are opening to them, they want information, not vague promises on which to base a decision. One source of the facts are role models, women who are actually pursuing a science career.

Viewed from the other side of the fence, women in training for or actually pursuing science careers are very willing, if not eager, to demonstrate that "the water's fine, jump in." Almost every population center has a university where women are training for careers in the sciences. Many companies have young women engineers on their staffs, and in many cases these companies are anxious to display their women professionals. On the one hand, it's good business to show how up-to-date they are to employ women in non-traditional jobs; but on the other hand, and more importantly, these employers have discovered a heretofore largely untapped source of outstanding talent and they are eager to employ more talented women.

To locate role models, contact science departments or women's resource centers at a local university, a local hospital, the physicians section in the Yellow Pages of the phonebook, or a local professional society such as the American Medical Association or Society of Chemical Engineers. The federal and state governments have been especially active in hiring women professioals. Each federal region's Women's Bureau of the Department of Labor can help you contact women in science. Also, agencies involved in wildlife, energy, food and drugs, communication, aviation, etc., are sources of women scientists. Many private companies, both national (like AT&T, GE, and IBM) and local, employ women and often are anxious to assist you in finding women scientists. Do some brainstorming with your students; check with the research desk of the library; treat this task as if your were writing a research paper, and you'll be surprised how many women scientists can be found.

Once you have found your role models, they can be invited to your class (it's also good for male students to find out that a woman can be a scientist) or an after school club or group; or you and your talented women students or an individual student can visit the role model on the job. The onsite visit has the advantage of showing off the job's apparatus and activities, which may "turn on" your students just as much as the interview.

One caution here. You should informally talk with and "check out" your potential role models before actually asking them to serve that function. Let's be blunt. If you want to excite your students about a career in science, you will want to present role models with whom your students can identify and who can communicate the excitement of the career area. If you can find a variety of role models (and that's what we're suggesting), then these women should represent not only a range of science career areas, but also a variety of life styles—single or mar-

ried, with or without children, and new or well established in a career.

Your role models should not only discuss their careers but also describe how their career fits in with other parts of their lives—as parent, or spouse, leisure activities, community work, and so forth. Following is a sample interview schedule to use as a basis for talking with the role model, but don't feel tied to these questions. Let the conversation flow its natural course, although you should try to make sure these questions are raised. You may want to reproduce and hand out these questions to your students.

Interviewing a Woman in Science

1. What's your job like? What do you do?
2. What's a typical day like?
3. What do you like best about your job?
4. What do you like least about your job?
5. How did you decide to be a _____?
6. What did you want to do when you were my age and how did your plans change?
7. What other work have you done?
8. What other careers interest a person with your kinds of interests and abilities? Are there areas related to your own that I might pursue as part of "the wave of the future?"
9. What do you expect to be doing in your career in the future? Where does your career lead?
10. What kind of training and experience should I pursue in order to enter your career area?
11. How do you arrange your life in order to have a professional and family/social/community/leisure life? (Answer this question both in terms of day to day scheduling and long term, year to year, scheduling. Underlying in this question are other questons like, "Can I be a mother and pursue a career like yours?" The specific underlying questions depend on the kind of life style the specific questioner envisions for herself.)
12. How have important people in your life (like mother, father, husband, children, friends, etc.) felt about your work?

Module B
"What Do I Want Out Of Life?"

Objective—Probably men should have similar concerns; but women, are especially concerned about how to balance anticipated roles of career person, parent, and spouse. Since traditionally a woman's life has been so dependent upon a man and upon her particular marriage and parental arrangements, women often find it difficult to clarify their career and life goals. The objective of this module then, is to help women *take control of their lives* by describing their personal capabilities, clarifying their own life goals, and analyzing their process of making personal life decisions.

Take control of your life. That's the message. Make considered, rational decisions about career, marriage, family, and other important aspects of your life. (By the way, if as a teacher you feel vaguely uncomfortable that you haven't made such a choice in relation to your own career and if you'd like to take positive action in your own career selection, then read *What Color is Your Parachute?* by Richard N. Bolles [Ten Speed Press, Box 4310, Berkeley, California, 94704]. It provides sound advice and a plan of action for the potential career changer; and even if you don't read it as a career changer, *Parachute* provides advice you can pass on to your students who are in some stage of changing careers from student to something else.)

Activities—In this module a classroom teacher may be more comfortable seeking the assistance of a counselor. These activities will not easily fit into the typical activities of a science course, so you will probably want to schedule a special separate session (e.g. after school) for about nine to thirty female students. These activities particularly well in a workshop for women from several schools. With the exception of some very large schools, talented women students are few in number and may feel vaguely isolated and "strange." The multi-school workshop can facilitate comraderie and support for these women who are making decisions which may not be the norm among their classmates. The special workshop takes advantage of a form of peer pressure from among the talented women and helps these same women combat and deal with pressures from their classmates.

The workshop or special session should be conducted in a spirit of exploration and acceptance of new options, which facilitates discussion of ideas, insights, and information that emerges from the participants. The setting should be informal; a carpeted room, comfortable attire, and a casual atmostphere are most conducive to personal exploration and interpersonal exchange. An element of fun and relaxation—sitting on

the floor, enjoying refreshments, sharing small talk—takes the edge off the more serious parts of the session and adds to the success of the workshop.

The workshop leader has a key role. Perhaps this person sould be unknown to the participants, so that she/he doesn't have a pre-set identity, especially if that identity includes being an answer-giver, which we often possess as teachers. The leader should give directions for the activities and be available to help in case of difficulties, but the leader should not lecture to the participants. The directions for each activity should not be read like a script, but rather adapted by the leader into his or her own style and words.

The following activities, unlike Module A, should be undertaken as a package and will take about two and a half hours to complete. These activities should be followed on the same day or in succeeding sessions with activities chosen from succeeding modules or from Activity Five (Role Models) of Module A, because these Module B activities cannot stand by themselves, even though these activities should serve as a prelude to succeeding modules.

Activity One
Introduction

15 minutes--Each participant will arrive at the workshop with her own set of expectations. Unless you have carefully prepared each one, the women very likely will expect that you are going to TELL them about the science career options that are available. Therefore, you must prepare them for the fact that you will be raising questions primarily and that the answers are within the women themselves. Make five explicit points to your participants.

1. *In this exploration you will be asking, "What Do I Want Out Of Life?," rather than, "What Do I Want Out of a Career," because your occupation affects other aspects of your life, just as non-career goals and aspirations affect career patterns.*
2. *Because of your high ability, you are a special group of people who have a wide range of choices; early examination of career and life alternatives means that fewer doors will be closed inadvertently.*
3. *Life planning is a* **process** *of figuring out what you want to do and finding a way to do it. You've already begun the decision-making process and will continue the process even after you are involved in a career. Every person attending this workshop has a unique process and will be at a different stage in her process. Regardless of how decided or confused you are, that's O.K. That's where you start from today.*
4. *This workshop will help you explore your interests and abilities. This*

exploration implies two equally important procedures: defining your own potential, and researching ways to apply it. The first part of the workshop is a personal exploration which will be followed by

_____.

(What you put in the blank depends on how you plan to use succeeding modules.)

5. *Motivating you to find out what careers are available "out there" and helping you to discover ways to find out the answers are more important than providing all the answers about every field of work. If I would provide answers for questions you haven't asked, then that information would be about as valuable as answers to a trivia question.*

Have everyone (including the leaders) introduce themselves by sharing their current decisions and plans. Then participants break up into groups of three. If participants come from a variety of schools, groups of friends should be split into different groups (of three) as much as possible. Explain that these discussion groups will allow every person a chance to express herself. Participants can be most helpful to each other by asking questions, pushing each other to consider the implications of their work, and being supportive of each person's unique ideals and aspirations. The leader may want to talk briefly about listening skills.

Actvity Two
Capabilities

30 minutes—*This exercise provides a means to describe one's self in terms of values, skills, and resources. What an individual does well and enjoys are important clues about what kinds of activities will prove satisfying in the future. The content of this exercise might well be the building blocks for fundamental life style decisions. Knowing what one has to work with often affects self identity and personal aspirations.*

Hand out a "Capabilities Worksheet" to each participant. After each question draw at least ten lines that are left blank. Our worksheets have covered three 8½"×11" pages.

Capabilities Worksheet

1. When do you feel fully alive?

_____

_____

_____

_____

_____

2. What do you do well?

3. What would you like to learn?

4. What would you like to *stop* doing?

5. What do you do now that you'd like to continue doing in the future?

6. What resources do you have in your life?

This exercise is called the life inventory. In this exercise you generate **as many answers as you can** *to a series of six questions I will ask you. These are questions about your values and the resources you have for realizing your goals. A good procedure for constructing your life inventory is as follows: first, take a few minutes alone to write down as many answers to the questions I'll be asking as come to mind* **quickly and without thinking too deeply**. *In fact, the more spontaneous you can let yourself be, the better. Stay with one question until I go on to the next. Be honest with yourself. Don't write what you think you "ought to write"; write what you believe. When we have finished listing answers to all six questions, we'll share them in our groups. It could be that others' answers may suggest things you'd like to add to your list. Here are the questions:*

1. *When do do you feel fully alive? What things, events, activities, people, etc., make you feel life is really worth living?*
   Pause two to three minutes between each question while the students jot down their answers. You might stare out the window or do something else to show that each woman should answer the questions herself.

2. *What do you do well? However small or unrecognized or seemingly unimportant, what are the things you know how to do?*
3. *What would you like to learn to do, or learn to do better? What things would you like to try? What would you like to* **start** *doing?*
4. *What do you do now in your life that you'd like to* **stop** *doing? What things happen to you that you'd like to discontinue?*
5. *What do you do now that you'd like to continue doing in the future? What are the things that you don't want to give up?*
6. *What resources do you have in your life? What are the things you have going for you, the things that can help you get what you want? They may be things, people, money, skills, advantages, or whatever provides opportunities for you or gives you support.*

Now go back to "What would you like to learn?". Beside each suggestion put the symbol or symbols which indicate what you need in order to actually begin doing that activitiy. Put a "$" if it's money, a "P" if it's people, and "E" if you need education or some training, a "C" if it would necessitate a radical change of life style, and a "W" if it calls for will power. On a blackboard, overhead projector, or cardboard sign, display the symbols for the participants.

What Do I Need?

$ = Money
P = People
E = Education or training
C = Change in life style
W = Will power

After the students have completed answering the capabilities questions, the students in each group should have a chance to discuss their answers. Read and post these new questions which they should discuss after each group member has shared her answers to the original questions. Remind the participants that you as a leader will provide help, if they ask. If they do not ask for help, drift from group to group to listen in, but generally act solely as an observer.

1. What items appeared over and over again?
2. Did you have trouble thinking of good things about yourself?
3. Do any of your answers seem to fit together?
4. Are any of your answers incompatible?
5. What kinds of necessities did you list for the question, "What would you like to learn?"

Activity Three
Ideal Life Scenario

30 to 45 minutes—This fantasy encourages people to break free of the limitations and thought patterns they normally experience and explore a life style they would ideally like to move into. It helps stifled wishes and personal dreams to come into focus. Participants' future visions often incorporate their capabilities and eventually shape decision-making. Fantasizing is important because we rarely actually do anything we haven't previously imagined ourselves doing.

Fantasy is a fun way to try on new possibilities, to see "how they fit" in your imagination. Visualizing your future is an ideal way to break free of your practical limitations and your habitual thought patterns about the future. Thinking in ideal terms is a good way to get in touch with some of your core values that are important in personal planning. If you're not a "fantasizer," try it as a way of exploring some life styles for yourself. If fantasizing is easy for you, take this chance to clarify your future dreams. Dreams and aspirations surely influence the way you live and the decisions you make.

Hand out blank paper and pencils, colored pencils, or felt pens. *Find a comfortable place by yourself on the floor. Close your eyes for a few minutes and try to picture your ideal home ten years from now.* You may want to turn off the lights, so only subdued light is available. *If everything goes as you hope, what will your home look like? Picture as much detail as you can. When you've got it clearly in mind, draw it, either a floor plan or the outside.* Allow time (about five minutes) for people to draw.

O.K. you've got a place to live. Close your eyes again and relax. Let's take a trip to your home of the future. This is a free wheeling fantasy, so let your imagination run. This is a chance to play with the ideal situation for you. If you could have your life work out ideally, *if everything turns out just as you had dreamed, what would your life be like ten years from now? Imagine that you're living how you most want to live; that you're doing*

what you most like to do. Where is this home located? Try to picture who the important people in your life are. What do you do each day? What is the source of your income? What do you do in your spare time? Fill in the image with as much detail as you can picture. Remember, this is what you'd most like to do and how you'd find the greatest personal staisfaction in life. If you have a hard time visualizing this ideal situation, try going hour by hour through a typical day and imagining all the things you'd do. Pause three to five minutes. *When you're done, get up, turn your drawing over or take a blank sheet and jot down the details of your fantasy.*

As in the capabilities exercise, each group should discuss their responses for fifteen to twenty minutes.
Read and post these questions.

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1. What will your life ideally be like ten years from now?
2. How clear is your picture?
3. How do you feel about your "ideal future?"
4. What parts of the dream are sheer fantasy and what parts feel like they could become reality?
5. Is your dream a product of your own choices; is it a product of what other people expect of you; or is it some combination of these two factors?
6. What parts of the dream are unique to your being a woman?
7. Do these parts feel like constraints, or privileges; automatic roles, or roles made by choice?
8. What barriers are there to the dream's fulfillment?
9. What elements of the dreams were common to each person's dream?
10. Were any of the common elements related to your being a woman?

Take a break. Pass around refreshments. Regroup in 10 minutes.

Activity Four
Science Capability Inventory

20 to 30 minutes—*Fantasies must have some basis in reality, but we cannot let our perceived realities dictate our dreams. We've spent some time*

looking at both the realities of our interests and abilities and the shape of our dreams. Now let's return to the realities of our capabilities.

Pass out a worksheet on science-related capabilities.

Science-Related Capabilities

Do I do these things well?	**YES**	**NO**
Solve mathematical puzzles	.....	.....
Read maps	.....	.....
Work independently	.....	.....
Think through abstract problems	.....	.....
Accept responsibility for tasks	.....	.....
Do I like to do these things?		
Use tools or instruments	.....	.....
See how things work	.....	.....
Meet challenges	.....	.....
Succeed	.....	.....
Explore the unknown	.....	.....
Do I have these resources?		
Background in science (at least 2 courses)	.....	.....
Background in math (at least 3 courses)	.....	.....
Ability and motivation to finish projects	.....	.....
Curiosity about the physical world	.....	.....
Tendency for creative and original ideas	.....	.....
General academic ability	.....	.....
	TRUE	**FALSE**
I do not like highly structured situations with many rules	.....	.....
I do not like repetitive activities	.....	.....
I do not easily accept conventional ideas and attitudes	.....	.....
I do not need to experience the rewards for my work immediately	.....	.....

Fill out the Science-Related Capabilities sheet. Allow one to two minutes to complete the task. *Items on the inventory are all qualities that practicing scientists have to some degree. Those people who have studied vocation*

interest have found that if your interests are similar to someone in a particular field who enjoys their job, you too will probably be satisfied with that type of work. These items are not requirements for being a scientist, but if you've checked at least ten on the left side of the line, you may want to consider what this indicates.

At this point the leader may want to find out how people responded by a show of hands. It's important to emphasize that it is their interpretation of these data which is important. If your students have been selected for talent in science, then almost inevitably they will have checked at least ten items in the left column.

Compare this inventory with the first one you did. How many of you included as personal resources any of the science-related capabilities on your list of things you do well, or as things you enjoy doing? How many even thought of your science background as a resource? How many of you included a science-related career in your fantasy?

Responses here should lead into a brief discussion of the issues of societal pressures and expectations for a woman. You should describe what follow up activites you have planned for them to get more information about science careers.

Activity Five
Major Decision Analysis

30 minutes—The purpose of the major decision analysis is to help women get in touch with the important dimensions which influence their behavior. These dimensions are not only places, things, and events, but also important people, feelings, perceptions, norms, etc. This exercise centers on how one decides to use her own resources and capabilities in order to realize her dreams. The decisions one makes or fails to make affect the steps leading toward one's goals and ideals. An awareness of influences shaping participants' lives will make them more able to control their own destiny. Understanding and controlling these factors is an essential step in life planning.

You've reviewed your capabilities and given some thought to your life ten years from now. Let's take some time to consider how *we use our skills to move in the directions we choose. The ways we use our resources and the routes we actually select are influenced by many, many things. The next exercise will help you identify and understand the influences, pressures, etc., that shape your decisions. If you understand these forces, you'll probably be better able to control the forces. Generally this control leads to more satisfying choices.*

Chances are you've made good and bad decisions; some made you happy and others were obvious mistakes. This is a chance to learn more about

making personally satisfying decisions. Think back over the last year or two and pick out an important decision you made; some point where thewre were two or more definite alternatives (like going or not going somewhere, joining or not joining, continuing a relationship or breaking it off, going to one college or another).

Do not continue until everyone has a decision in mind. You may have those participants who do have a decision in mind share the decisions as examples.

Hand out a worksheet entitled Decision Analysis.

Decision Analysis

		Forces supporting this choice	Forces supporting this choice	
one alternative	1.			the other alternative
	2.			
	3.			
	4.			
	5.			
	6.			
	7.			
	8.			

On the workshop page entitled "Decision Analysis" write the two alternatives that were most possible. There's a space on either edge of the page to write the two possible routes.

Then, in the column on the left write all the reasons for choosing the alternative at the left edge of the page. Do the same in the right hand column.

The idea here is to really think about all the influences that played on either side of the decision. These influences can be practical considerations (like location or money), feelings, habits, pressures or demands, expectations from important persons in your life, your mood, or whatever was the least bit involved.

You might want to consider if your being female came into play in the decision-making process.

When you've listed all the things you can think of, put a star by the influences that pulled most heavily *for each side.*

Pause three to five minutes while they complete this exercise; then pass out a new worksheet entitled "Control of the Decision."

Control of the Decision

Relist the forces supporting each alternative, but in a different order. Above the dotted line, write the forces that you had control of or that were inside you. Below the dotted line write the influences that were external or out of your control. When you have reordered the list you made on the preceding page, place a star by the forces that had the most pull in your decision-making process.

First Alternative:	Second Alternative:
Forces in my control	Forces in my control
Forces outside my control	Forces outside my control

Now, reorder the list. The idea here is to separate the influences into two groups; internal and external reasons. Internal reasons are your own wishes, feelings, beliefs and ideas that are within your control. They come from inside **you**. *External influences are things or people or events in your environment that are outside your control and yet affect the way you act. Things like lack of money, no transportation, and demands from a friend fall into this category. Many of these external influences are subtle. You may not even be aware of them, but you feel them in your gut. You* **know** *when someone is disappointed with you. External influences often come in the form of "shoulds" from parents, teachers, and society in general. (You "should" do something worthwhile; you "should" make more money; you "should" have a new outfit for the dance; you "should" choose home economics instead of shop.)*

Keep all your reasons on the same side of the center line, as on the preceding worksheet, but rearrange them so the external reasons are below the dotted line and internal reasons above the dotted line. Transfer your stars to this page. Take a few minutes to think about your decision.

Pause three to five minutes while the participants complete this exercise.

Let's get back into consulting groups to see what all this means about **your** *style of decision-making.*

Post and read these questions as you have done in preceding discussions.

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1. Did you have trouble thinking of a clear decision you actually made? (If you did have trouble, you may be giving up some of your power by letting outside factors control your direction.)
2. Looking at all the dynamics of the decision, are you satisfied with your choice? (If not, maybe some influences should have carried more weight, and others less.)
3. Do many of these same influences enter into other decisions you make?
4. Who are the important people on the lists?
5. Are your starred items in the internal or external category and are you satisfied with where they are?
6. How did being female affect your decision-making process?
7. You'll be going through some major changes in your life pretty soon; would you like your pattern of influences to change in any way?
8. Any other insights?

Activity Six
Wrap-Up

5 to 15 minutes—The purpose of this activity is to summarize what you've tried to accomplish, review what has happened, and describe succeeding activities. We suggest you assign activities from Module C, "How Do Parents and Friends Affect A Woman's Career Choice?," since these activities can largely be done as "homework" and serve to deepen the insights gained in Module B. Module B also naturally leads to Module D, "What Careers Are Available?," if the participant feels ready to dig into information about a particular career. However, if a participant feels "really lost," then it's time for some individual career

and life advising. Make certain that you have resources, either yourself or others, to whom you can refer the latter students.

Remember that the following points will be modified by what has happened during the workshop and by what you have planned as succeeding activities.

Career decisions cannot be made in a vacuum. You need to know what capabilities and resources you have going for you and you need to know where you're going—what you want your life to be like. You also need to know what influences shape your decision so that you can better handle a career decision, perhaps one of your most important life decisions.

That's what we've tried to do today—look at your capabilities, ideal future, and decision-making process. From here we'll go in two directions.

On the one hand, we'll look more closely at influences which in part shape your career decisions. You'll read and think about what some sociologists have to say about the process by which women learn their "appropriate" roles. You'll especially try to analyze how true that theory is in the reality of your own life.

That's one task. The other task is the gathering of information about a career or several careers in which you are interested. Some of that information is available in books, and some is available from women who are already pursuing the career that interests you.

Perhaps right now you feel very confused or maybe you just want to talk with someone about what's been going on today or about your career plans. Don't feel badly if that's how you feel. Many people, boths girls your age and adults, have doubts. That's normal. If you'd like to talk, then .....
(Describe the resources for individual career and life advising.)

Describe the specifics of the next activity. Distribute necessary worksheets. The next activity shouldn't start for at least two hours, and several days could intervene. The participants need time to relax and consciously or unconsciously digest the day's questions, answers, and discussions.

Module C
"How Do Parents And Friends Affect A Woman's Career Choice?"

Objective—People don't make career choices on their own. Whether the influences of others are recognized or unrecognized, parents and friends of both sexes do affect career choices. If talented women are to be supported in their career choice however novel or inappropriate it may seem to parents or friends, then these women will have to learn to deal with parents and friends. The objective of this module is to help talented women students cope with family and important others by (1) describing some aspects of female socialization, and (2) discussing life plans with family and important others.

Activities—This module, which should follow Module B, can be done as homework or, in part, as a workshop. Neither format lends itself to typical science classes, so the work probably will have to be done outside of class.

Activity One
Female Socialization

Just how does an eighteen year old person with two X chromosomes find out how to act and what to expect out of life? That question can be the focus of a life's study, but in this activity your students will touch upon the highlights. They will read about patterns of female socialization and then analyze their own lives to see whether the theory presented has validity in their own experience. This activity draws heavily on one book, Cynthia Fuchs Epstein's *Woman's Place*, which we have found to be the best resource for young talented women—it's readable, to the point, relatively inexpensive, and speaks eloquently to women. However, you may have other more accessible books or articles which could be substituted for *Woman's Place*.

Have your students skim the first fifty pages and then read carefully pages 50-86 of *Woman's Place: Options and Limits in Professional Careers* by Cynthis Fuchs Epstein (University of California Press, Berkeley, California, 1971). As they read about the socialization of women, they should keep their own lives in mind. When they have completed the reading, they should write a three to five page paper answering the following questions below. Once the papers have been written, bring the students together to discuss their answers. We have found that role

models (see Module A, Activity Five) can enter profitably into this discussion.

Female Socialization

1. How do you react to the socialization process described in *Women's Place?*
    a. Does the process ring true for yourself?
    b. ...for women your age or for older women?
2. How does your own childhood and education compare to this description?
    a. Can you remember any incidents from your own life that fit in with this description?
    b. How have events or people in your own life subtly or overtly shaped your attitudes and motivations?
3. Would you characterize yourself as "traditional" or are you more "non-traditional," or do you defy description? (Consider your current and future roles as parent, spouse, and career person.)
    a. Why do you think you are more traditonal or non-traditional?
    b. Is this the way it will always be?
4. See if you can trace the development of your attitudes about math and science. What events and people have influenced your feelings about achievement in these areas?

In own use of this activity, our talented women came to a wide rang f realizations. One woman spoke of the power she had felt on a recent date, when, by a combination of chance circumstances, she had driven her own car to pick up her date, go to the movie, and take him home. This rearrangement of conventional social interaction made her realize how much of her decision-making power she had previously been willing to leave in someone else's hands.

Another woman from a rural setting recognized the pressure of family and friends who wondered about her reasons for entering a pre-med program at the university. "Who's heard of a lady doctor?" "What will your husband and kids do?" "Isn't it nice that Sally's getting married!" Recognizing these subtle and overt pressures being applied to her, she was better able to deal with them.

Yet another woman said that yes, this socialization pattern had oc-

curred in her own life. "But, so what? I like it." She recognized that she had been taught to want certain things in her life; and, she was better off for that recognition.

This latter episode illustrates an important point. If we are honest with ourselves, as users of the activities in this book, we are advocating that talented women pursue a career as one part of their adult lives. We should be clear both with ourselves and our students on that point. However, even though we assume an advocacy role, we must recognize the right of each student to make a reasoned choice not to pursue a professional career; but, even in that choice, the student will have benefited from making a conscious and informed choice, rather than slipping into a life style without exercising a choice.

Activity Two
Conversations with Family and Friends

Having made some tentative career and life plans, and having studied the female socialization process, the talented woman student can now turn to recognizing and learning to deal with the influences of other people important in her life. Usually these important others take a well meaning interest in the direction of her life. These people may be friends, a boyfriend, parents, grandparents, certain teachers, a counselor, an employer, a minister, or any other special person.

Give each of your talented women students the following worksheet or give the directions yourself. Your student will be talking with important others who are either supportive, neutral, or unsupportive of their life and career plans. After the conversations, the students should write a three to five page paper summarizing, analyzing, and reacting to the conversations. After the papers have been written or as an alternative to the papers, bring the students together after school for a discussion of the conversations. Again, role models can make useful contributions to these discussions from their own experiences.

We have found that important others, especially parents, will actively disavow any influence on the young woman's career and life plans, yet the women report experiencing a great deal of influence from these important others. In the conversation, you should help your talented women decide whether the influence of important others is real and direct (e.g. the parents will not pay for a college education, if she enrolls in pre-med), only imagined, or somewhere in between.

Sharing With Important Others

In making decisions about the future, other people have an influence on what you do. Usually the people you care about most are concerned with the direction of your life. Often this concern is well meaning. These people may be friends, a boyfriend, parents, grandparents, certain teachers, a counselor, an employer, or any other special person.

It is likely that some of these people support your plans and are willing to help you in any way they can. You usually feel comfortable around these people when discussions of future plans come up.

There are probably other people in your life who are neutral. These people are not exactly discouraging, but you can sense their lack of encouragement. They just don't get excited about your plans and decisions, and you probably avoid those topics around them.

In this day and age when there are so many diverse feelings about women's roles, there may also be those who are clearly unsupportive of your plans. It could be that your aspirations and plans are "too traditional" (centered entirely around the home), or "too radical" (centered around alternate life styles, career success, or a non-traditional career). Or it could be that your important others are dissatisfied with your lack of decisiveness. In any case, some parts of your future plans may conflict with this person's values.

As you make choices about your life style and career, you'll probably be aware of those who support you, those who are ambivalent, and those who do not support you. You'll have to relate to all of these people at one time or another, even if it's only in your imagination. This assignment will give you practice in dealing with all three groups and accepting the fact that "you can't please all of the people all of the time." Whatever choices you make (whether it be what college, what residence hall, what career, which friends, etc.), it's handy to know where your support is and how to call upon it. It is equally important that you be able to maintain your confidence and will power amidst your "caring critics" and those who are not whole-heartedly with you.

This assignment is a written comparison of four discussions. Think of two people that you feel close to and who you think are in basic agreement with your ideas about the future. Arrange a private time with each of these individuals to have a serious discussion about your life style and career interests, and to get their reactions to these plans. Explain your ideas, questions, uncertainties, aspirations, etc., as fully as you can and ask for their feedback. After each conversation, jot down the responses that came across, either as words or just feelings they conveyed to you.

Also note how you *felt* during the conversation, about yourself, the other person, how the discussion went, etc.

Then think of two people that you really care for (people whose acceptance and approval you'd like to have, but who you believe aren't completely supportive of your plans. They could be either neutral or definitely opposed to your life planning. Try the same discussion with these people, expressing as fully as you can the thoughts and issues that revolve around your future life style and career options. Again, write out the feelings and verbal responses you perceived. Also, describe the range of feelings you experienced during and after the conversation.

For many of you, your parents are very important in your lives. Try to include your parents in this discussion.

Hand in a written description and comparison of these four conversations. You may want to deal with some of these questions:

— Did any of these people influence you in any direction during the conversation? If so, did that feel O.K.?

— Do you feel the same way about your plans (or lack of plans) now?

— What do you think is the best way for you to deal with your "non-supporters" with regard to future plans, so that your relationship remains comfortable?

— Do you feel like you're getting enough positive support? If not, where are other places you could actively look for it?

— What did you learn from these discussions?

Module D
"What Careers Are Available?"

Objective—"Where are the openings?" "There's always a need for nurses." "Look at all these engineers out of work." "Teachers are a dime a dozen." "Do you think you'll be able to find a job?" These questions and statements represent our misplaced emphasis on looking at the job market first when making career choices. However inappropriate this emphasis may be, the question still remains, "What is available?"

This module expands on that question in order to help talented women students investigate in depth one or more science careers in which they are interested. When they have completed these activities, they will have looked at a possible career from enough angles that they can make an informed decision whether to pursue that particular career.

Let it be clearly stated that we do not advocate beginning career exploration with this module, even though this is the point where much career exploration is started. We assume that before you lead your talented women students through these activities, your students already will have analyzed their capabilities and life plans. Based on that analysis (rather than a reading of the want ads), they will have recognized a general interest in a professional, science-related career. Ideally, they will have a working knowledge of female socialization and how that process has affected their own lives, including their decision-making process. These talented women will be ready to take control of their lives to make an informed career decision. They should now be collecting information about a career which will become part of the data fed into the career selection process.

These activities cannot be clearly separated from activities in other modules. For instance, these activities overlap greatly with Module A, "Turning a Girl Onto Science Careers." However, the emphasis here is on individual, in depth information gathering, rather than a superficial perusal of the fields.

Activity One
Zeroing In On A Choice

If your talented women students have already selected one or even a few professional, science-related careers for investigation, then proceed to Activity Two (Getting The Facts). If your talented students have only

indicated a general interest in science-related careers, then start them here with activities closely related to Module A.

Refer your students to J.S. Mitchell's *I Can Be Anything*, the *Occupational Outlook Handbook*, or any of the other books and pamphlets listed in Activiteis 1-4, Module A. Suggest that they leisurely read through *I Can Be Anything* and pick out three or four possible career areas. If they're really unsure about what careers to investigate further, then suggest that their selections be as divergent as possible and still fit their interests.

(We admit that this procedure is somewhat hit-and-miss. However, at this point you are dealing only with those students who have no leads about what science-related careers to consider; the majority of your talented women will be able to skip directly to Activity Two. Others will find rather broad career categories in *I Can Be Anything*. They will be able to more sharply focus their choice after gathering and sifting more information and through the web of information they already have about their own capabilities and life style desires.

More sophisticated career selection techniques do exist, but this activity can easily be used successfully by classroom teachers.

Activity Two
Getting the Facts

Once your talented women students have identified two to four possible science careers, they can collect information individually. Give each woman a "Career Research" worksheet similar to the one following, but modified to emphasize the resources available in your school. Point out that information can be obtained from talking with women and men in their selected fields in addition to printed material. This career research should be as thorough as the student can possibly make it. After all, this information will be one important part of a decison that will affect the rest of her life. Why not devote some time to this process?

If your students do interview a woman or man in the field, suggest that they supplement their interview with questions from "Interviewing a Woman in Science," Module A, Activity 5. That interview schedule includes a very important question, "What other careers interest a person with your kinds of interests and abilities?" The answer to that question may open up new career areas previously unknown or unconsidered by your talented students. Chances are the role model will have interests and abilities similar to the inquiring student, and the role model will have done some of the career searching already. For example, your student may talk with a university research chemist, who in the course of her professional life will undoubtedly have considered other career areas. The student may never have considered some other

areas—say, meteorology or dietetics; but now, coming from someone with comparable interests and abilities, these new career areas may appear attractive.

Stress to your students that career research is never completed, but is a process that will continue throughout training and even after entering a career. What your student should be looking for now are clues to that particular career field which fits in with her abilities, interests, and life plans.

Although this collecting of career information is a highly individual process, you may choose to get your students together to discuss and compare their findings. If you can identify major interest areas, such as engineering or medicine, you may call on role models from those career areas to take part in your discussion groups. The role model should dispense information about her career, but more importantly, she should enter into the discussion, asking questions, affirming or questioning the information reported by the students, and suggesting new avenues to explore.

Career Research

This assignment draws upon your ability to do research. Given your level of success in high school and your capabilities in math and science, you have unique career possibilities open to you in the sciences. At this point you may be excited about this area of work, or you may be undecided. In any case, this is an opportunity to research the options. The more data you have about different occupations, the better choice you can eventually make. No one is asking you to choose now, just to start accumulating information.

The assignment is to research as thoroughly as possible a science career that may possibly interest you. Use the attached form as a basis for inquiry; and find out as much as you can from the sources you have availabe.

Information can be found in career pamphlets, in magazines, from conversations wtih students, teachers, and professionals in your area of interest, from library sources, and at guidance centers at local colleges. Try to assume the "assertive detective" role to locate all the information you can. An important source that you should definitely look at is the *Occupational Outlook Handbook*. This book is a catalog and description of many, many careers, and includes a listing of additional sources of information on each occupation. The *Occupational Outlook Handbook* can probably be found in your school counselor's office or in the library, Another superb source is J.S. Mitchell's publication, *I Can Be Anything; Careers and Colleges for Women*.

Occupation: _____

1. Description of work (activities, responsibilities, who you work with, how you relate to fellow professionals, possible setting, etc.):

2. Requirements for entry (training or education):

3. Requirements for advancement:

4. Salary (answer the question in relation to your desired life style):

5. Employment outlook (demand trends):

6. Value of this area of work (what is its contribution to society?):

7. Life styles that could go with this occupation (how would it affect other parts of your life and how do you feel about these parameters?):

8. Things you might like about this occupation:

9. Things you might dislike about this occupation:

10. What additional questions do you have about this field that remain unanswered?

Activity Three
Getting a Taste

"Experience is the best teacher" has some validity in the career selection procedure. After your talented student has zeroed in on one or two areas, she should seek some work experience, not only because that will start her on the training process, but also because that experience will help her check out her tentative selection. One caution: one work experience is not sufficient in and of itself to illuminate an entire area, and your students should not make hasty judgements on this basis. However, with that caution in mind, encourage your students to get some experience, "in the field."

Most job-related experience must be obtained by the talented high school or college woman on a volunteer basis, but the benefits should compensate for the lack of pay.

We have continually mentioned how your students should be brought in contact with role models, and here again these people can be helpful. A natural outcome of a conversation between one of your students and a role model can be the arrangement for some work experience. In fact, since your students are obviously talented and convey an honest interest in the career to the role model, they may be invited to do some work that could be considered experience.

Your student should not be shy about asking for a positon as the benefits are two way. Your student gains additional insight into the career area, and the role model gains an extra hand, or at least the satisfaction of introducing an interested young person to a career.

In some locations teachers or other individual organizations may establish some sort of formal internship program and act in some intermediary fashion between students and role models. We suggest, however, that you encourage your students to go directly to the role model, for such a procedure will reinforce the message of "Take Control of Your Life."

Module E
"What's It Like To Be A Professional Woman In A Science Career?"

Objective—There's a fine line between illuminating potential problems and solutions, and frightening talented women students. This module is aimed at the illuminating side of this line, however you will need to react sensitively and reassuringly to the concerns of your students.

In the preceding modules, you have dealt in part with the focus of this module; but now you will more clearly focus on questions such as the following:

> What's it like to be a woman in a "man's career," both in the college classroom and on the job?
> How do peers and other people react to you?
> How do you go about doing your job successfully?
> How do you balance your career with other important parts of your life?

As students answer these and similar questions, remind them of their reading of biographies, role model interviews, and discussions with parents and other people who influence their life decisions. These former activities provide important information for this module.

Activity One
Interviewing a Professional

If your students have not yet had a chance to talk at length with one or more professional women, then the time has come for such conversations. You may invite women professionals for a panel discussion with your students or send the students individually to interview professional women. This would be a good time also to contact young women in university programs, for they can provide current information about the college scene, where more and more women are entering a "man's world." Either in the interview or panel, use the following interview schedule to start and give structure to the conversation.

Interviewing a Professional Woman

1. What do you do in your job?

2. Tell me about your career. Where did you start? How has your career progressed? Where are you going?
3. In what other activities—parent, spouse, community member, leisure time—do you participate?
4. How does this all fit together? What's your day to day schedule like? What's your year to year schedule like?
5. Does being a woman have any effect on either your work or on how you organize your total life?
6. How do your colleagues relate to you? Is there any special relationship because you're a woman?
7. How about your family and friends? How do they relate to you as a career person?
8. Does your being a woman have any effect on how you do your job and on your being able to "get ahead" in your job?
9. Do you have any tips for how I might pursue a career?
10. Would you do it all over again?

Activity Two
Read About Women and Careers

This activity should be done in conjunction with Activity One. Several sociologists and career women have written about women and careers. Assign or provide a selection of this literature to your students. We have found pp. 86-206 in Cynthia Fuch Epstein's *Woman's Place: Options and Limits in Professional Careers* (University of California Press, 1971) very informative in describing problems and opportunities faced by women in careers and in balancing career roles and other roles. Martha S. White's article, "Psychological and Social Barriers to Women in Science," *Science*, Vol. 170, October 23, 1970, pp. 413-416, concentrates on problems, but should be assigned to make students clearly aware of the obstacles they may face as they pursue a professional, science-related career. If any of your studetns really get interested in this subject, they could also profit from reading the following three books:

Kundsin, Ruth B., ed. *Women and Success: The Anatomy of Achievement*, William Morrow and Co., New York, 1974. (This book's original title *Successful Women in the Sciences*, more accurately reflects its focus.)

Mattfield, Jacquelyn A. and Carol G. VanAken, ed. *Women and the Scientific Professions*, M.I.T. Press, Cambridge, Massachusetts, 1965.

Theodore, Athena, ed. *The Professional Woman*, Schenkman Publishing

Co., Cambridge, Massachusetts, 1971, (Fifty-two essays are eloquently introduced by the editor's essay, "The Professional Woman: Trends and Prospects.")

Once the interviews and readings are completed, your students should relate the two activities in a three to five page paper which addresses some of the following questions. The purpose of this assignment is to analyze the validity of observations that sociologists have made about women and careers.

Professional Women—Problems and Opportunities

1. What problems do women face as they attempt to pursue a professional career? In your reflection you may want to consider these areas—ability to do the job, desire to take responsibility, reaction of colleagues, attitudes of friends and family, conflicting roles as mother and/or wife, and job opportunities.
2. Based on your interviews, do any of these problems, in fact, exist?
3. What have the women whom you interviewed done to alleviate the problems?
4. How might you act to alleviate problems or concerns which you may face?
5. Some people say that a problem for typical professional families has been that the husband overemphasizes career and the wife overemphasizes child rearing and emotional support of her husband. One of the messages of the 1970's is that both spouses should equally share the responsibilities and rewards of roles formerly assigned only to one or the other spouse.

   a. How do you react to these statements? Is that sharing for you?

   b. Have others been able to arrange for that kind of sharing?

   c. What can you do to establish that kind of sharing relationship?

Activity Three
Combining Career and Personal Life

The previous two activities have dealt with solutions to problems

which must be addressed in order to prepare your students for their possible future careers. For some students the first two activities can be a "downer." This third activity is aimed at providing an "up" experience, so that students can focus on the positive possibilities and opportunities.

Point out that all professionals, female and male, face problems in combining a career with a personal life. The word, problem, should not be viewed as entirely negative. On the contrary, a problem can be viewed as a challenge or opportunity which must be dealt with in order for anyone to have a full life.

Look for and save articles which are ubiquitous in American popular magazines and books today. *Newsweek*, *Time*, *Ladies Home Journal*, *Redbook*, *Ms.*, and others have frequently reviewed success stories or provided analyses of women entering and dealing with all sorts of careers formerly rather closed to women. Make these articles available to students; or better still, ask your students to collect and share these articles.

Distribute the worksheet, "How Do Successful Women Combine a Career with a Satisfying Home Life?" If students have not read the selections from Epstein's *Woman's Place*, suggested in Activity Two of this Module, suggest that they read that material now.

How Do Successful Women Combine a Career With a Satisfying Home Life?

Below are listed some of the ways successful women have shaped their environment to allow for a full range of social and professional options. It *is* possible to be accepted by your community, succeed in the home and on the job, and be proud of both your professional and personal roles. None of these suggestions is necessarily "the best" arrangement; each person and situation is unique. These suggestions are given as evidence that thoughtful planning can help you develop your full potential.

1. Carefully select your activities so you can fulfill your commitment to those things that are most important to you.
2. Plan to have fewer children. It is helpful to co-ordinate their arrival with completion of an education or establishment in a career.
3. Designate part of the year, month, or week for work and part for family affairs (e.g., give your week-ends solely to your home life).
4. Schedule your day so there is time for your role as wife and/or mother and professional. Make sure the roles overlap as little as possible so each gets all the attention it deserves.

5. Delegate tasks to responsible, able persons (child care, cooking, repairs, travel arrangements, etc.).
6. Establish an internal set of standards to evaluate your success in your different roles, so you don't have to fulfill all the obligations of every role. For example, you can decide not to run for P.T.A. president or not to attend professional conventions.
7. Choose a career or working situation where others around you share your values and background so that you are understood and appreciated. The more ways you are like your colleagues, the less sex difference is evident.
8. If you're undecided about career choice or level of aspiration, keep your options open by continued training or education, good grades, and a broad sampling of experience. This could mean taking science courses although you're not sure you'll need that kind of background.
9. Being in the same field as your husband may reduce the burden of keeping up-to-date in the field, and may make it easier to maintain professional contact with fewer institutional affiliations. Some women find that working with their husbands allows for sharing the demands of work and home life.
10. *Before* deciding to get married, make sure you have an explicit contract or understanding with your prospective husband allowing you the space to pursue your career ambition.
11. A satisfying blend of social and professional life is easier when you make your colleagues your friends.
12. Take advantage of role relaxation (such as when your children go to school, you may pursue career ambitions).
13. If available and willing, use genuine role substitutes, such as Grandma or Grandpa.
14. Establish a supportive relationship with your spouse. This involves making a clear division of responsibilities so that expectations are understood. Emotional and practical support from your home is extremely important. The value of open communication, understanding of each other's needs, and mutual COMPROMISE cannot be overestimated.
15. Be conscious of choosing social contact with friends and family who encourage you, who help you establish productive and satisfying routines, who allow for your privacy, who accept and reward your professional ability.
16. If you can think of any other possibilities, fill them in....

17.

18.

19.

20.

Discuss the suggestions made in the worksheet and any additional suggestions your students can make. One reaction that some students may have and for which you should be prepared is that the worksheet seems to make the implicit assumption that a career women will also be a wife and mother. Indeed we have made that assumption, since we have found that most young women do expect to marry and have a family, regardless of career plans; but in talking with students we make the point that, like career, marriage and parenthood are not inevitable and that any of a variety of life styles are acceptable.

If your students express a particular concern about raising children, then suggest they read James A. Levine's *Who Will Raise the Children? New Options for Fathers (and Mothers)*, J.B. Lippincott Co., New York, N.Y., 1976. Levine focuses on men playing a more central role in child rearing and suggests career patterns which can facilitate the increasing desire of men to play the parental role. If nothing else, your students will begin to question the assumption that men are bread winners and women are child raisers and start to think about new life patterns that support both spouses' career and parenting needs.

Module F
"OK, I'm Sold On Trying A Science Career, But How Do I Get From Here To There?"

Objective—Even though your students may have completed many of the preceding activities and have a clear idea of their life and career goals, all of these plans and hopes may be "pie in the sky," if they don't begin taking action toward fulfilling their goals. As we have noted, young women often tend to delay action on career plans, as many contingent factors (e.g. possible marriage, geographic location potentially dependent on a husband's career, indefinite number and spacing of children, etc.) provide ostensibly valid reasons for putting off action on a career. This module is aimed at solidifying a professional, science-related career choice for your talented women students by their formulating, analyzing, and starting upon a plan of action.

Activities—These activities can be done as independent study or in a special workshop or class. If you use a group setting, members of the group can react to each other's plans, and role models can participate in the discussion.

Activity One
Resume

Ask your student to write a hypothetical resume that they might present for inital employment in their chosen career area. Emphasize to your talented woman that this resume will serve as the basis of a plan of action, but this activity's purpose is to highlight the educational and experiential credentials they will have to acquire prior to employment.

Hand out the resume form, which can be filled out based on information gathered in Module D, "What Careers Are Available?". You may encourage students to type the form so that they get practice in completing a neat, presentable resume.

RESUME

Name: _____

Address: _____ Phone: _____

_____

Career Objective

_____

_____

_____

_____

_____

Education

Undergraduate Institution _____

Major _____ Minor _____

Graduation Date _____

Graduate or Professional Institution _____

Major _____ Minor _____

Graduation Date _____

Graduate or Professional Institution _____

Major _____ Minor _____

Graduation Date _____

Experience

(Date) (Experience)

_____ _____

_____ _____

(add additional spaces, as necessary)

Professional Organizations

_____

_____

_____

_____

_____

_____

Recommendations

_____

_____

_____

_____

_____

_____

_____

The section on Career Objectives may be written in sentence or outline form; and it should contain both immediate and long range employment objectives.

The Education section should include, at least, both the undergraduate major and graduation date. By including a minor or minors the student will be stating what supporting areas will enhance her career preparation.

In order to complete the Experience section, the student should consider just what activities she will want to be engaged in during her career. She should find out what she can do to get practice in that activity. Whereas the Education section is straightforward, the Experience section is more elusive. If your student encounters difficulties, suggest that she go back to the professional person(s) visited previously and ask that person just what experiences would be helpful in testing out and learning about the career area. Visit someone training for that career to discover how that person is gaining experience in the career area. Visit an educator in the career area (e.g., an engineering professor, especially one involved in job placement) and find out what work experiences enhance one's ability to practice the career; or visit a person employing people in the career and seek the same information. At the minimum, each work experience could be described by title (e.g. lab technician assistant), but more importantly the experience section should describe the responsibilities associated with the job experience (e.g., performed blood counts, urinalysis, etc.) Attention should be given to presenting a logical progression to the entry job.

Point out that the sections on Professional Organizations and Recommendations are included only to alert your students to their necessity. In upcoming years she should seek out relationships with professors and practitioners who will be able to speak knowledgeably of her qualifications for employment.

When the resume is completed, ask the student to show it to someone practicing in that career area for review. You should suggest some questions to use in the review procedure.

Resume Review

1. Would you hire me with this resume for the entry job I listed in the Career Objective section?
2. What additional education and/or experience should I seek?
3. What education and/or experience that I've listed seems irrelevant or impossible to attain?
4. How would you go about getting the education and experience indicated on the resume?
5. How well does my immediate career objective compliment my long term career objective?
6. Does being female affect what kinds of work experience I should seek or will be able to find?

Once the resume has been completed and reviewed, ask your student to verify that her stated career objective does coincide with her desired life plans as specified in Module B, "What Do I Want Out of Life?"

Ask her whether she's ready to embark on the initial level of education indicated. If not, then what education prerequisites are needed? Is she ready to start acquiring the experience indicated? If not, what experience prerequisites are required?

Activity Two
Action

Your talented woman student knows her immediate and long-term career objective; and in her resume she has indicated what education and experience is necessary for entry into the career. Now she should put that education and experience into a sequence.

Ask your student to consider the entry job (her immediate career objective on the resume) as an objective at which she will aim. Put that objective in the box on the worksheet.

Action Plan

Entry Job—Objective
(Immediate career
objective from resume)

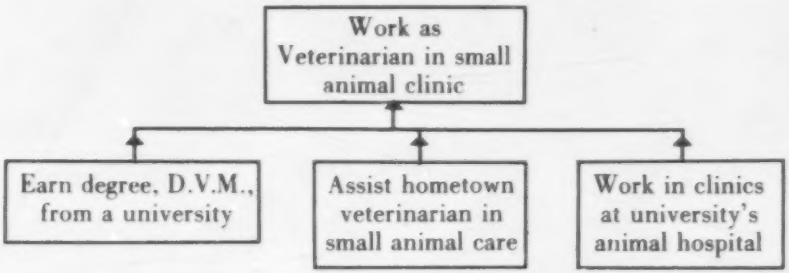
To put this plan into action I now need to: _____

_____

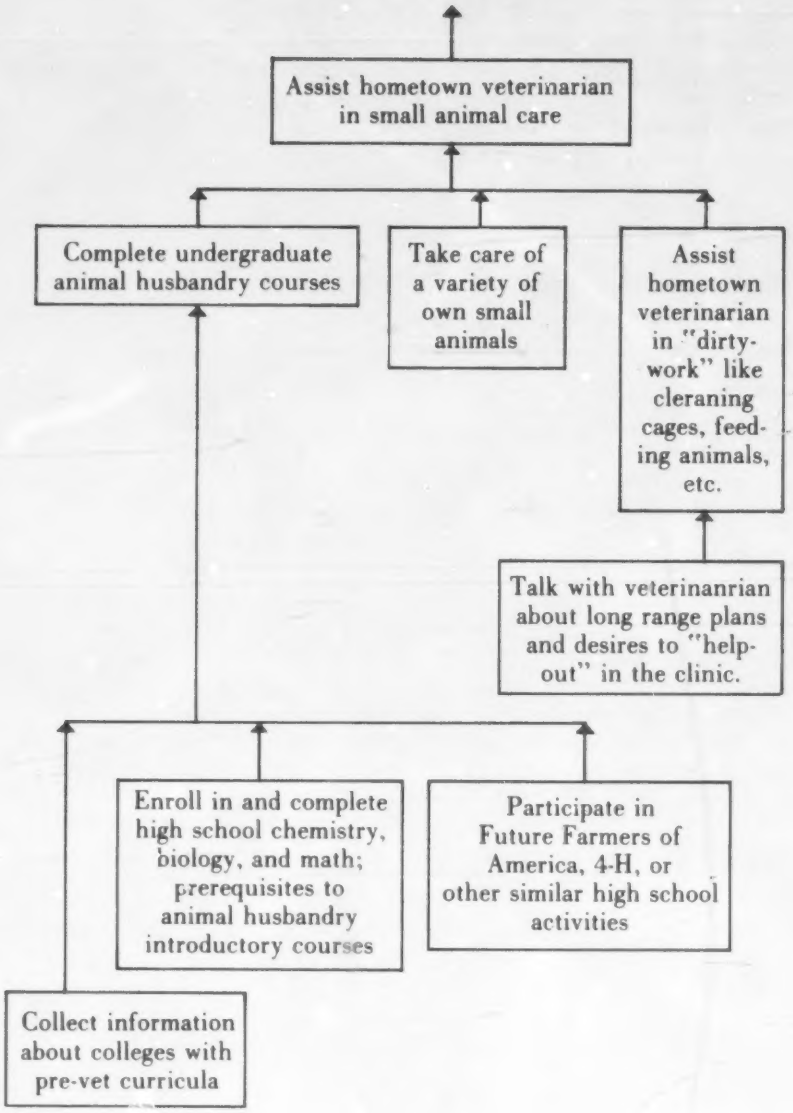
_____

_____

Now she should ask herself, "What credentials must I have in order to gain that entry job?" By credentials we mean primarily education and experience. In many cases she will recognize a need for a college degree and one or two job experiences. She should put these credentials on her worksheet as in this example. Notice that each box has an action verb which indicates what she will have to do. Also, notice that the lower actions will have to be completed before the higher actions can be started.

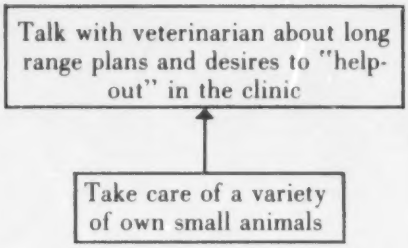

Work as Veterinarian in small animal clinic
Earn degree, D.V.M., from a university
Assist hometown veterinarian in small animal care
Work in clinics at university's animal hospital

She has now begun her action plan by recognizing that she needs a certain amount of experience and a specific degree before she can attain her entry job objective; and she is now ready to extend the action plan by asking, "What credentials do I have to have in order to gain that experience or education?" In our example, she may recognize the following additional experience and education as necessary before her hometown veterinarian will allow her to assist in small animal care.


Assist hometown veterinarian in small animal care
Complete undergraduate animal husbandry courses
Take care of a variety of own small animals
Assist hometown veterinarian in "dirty-work" like cleraning cages, feeding animals, etc.
Talk with veterinanrian about long range plans and desires to "help-out" in the clinic.
Enroll in and complete high school chemistry, biology, and math; prerequisites to animal husbandry introductory courses
Participate in Future Farmers of America, 4-H, or other similar high school activities
Collect information about colleges with pre-vet curricula

She should continue asking herself, "What credentials do I need?," until her answers include only the experience and education that she has already acquired.

Next, she should review the plan to make certain that the order of the actions she has diagramed seems logical. In this example, she may recognize that the hometown veterinarian probably won't take her aboard if she hasn't had some experience with her own animals, so she should move that task to a new place in the action plan.


Talk with veterinarian about long range plans and desires to "help-out" in the clinic
Take care of a variety of own small animals

Finally she should write next to each box an estimated initiation and/or completion date for the action.

Once the action plan has been worked out, her next action is logical. She will need to start at the bottom of the action plan and work up, guided by the dates next to each box. Ask her to write out the initial action or actions at the bottom of the worksheet.

And, presto, she's ready to go! After completing these modules, she knows where she's going, why she's going in that direction, what it will be like when she gets there, how she will go about getting there, and some of the pitfalls she may encounter on the way.

At least that's the theory. Of course, she will very likely modify or discard her plan as time goes on. That's life—it can't be entirely planned. However, having gone through these activities, she will be ready to make a new plan for herself and she will have more knowledge of herself, so that the new plan will be more appropriate.

What about those chance factors that are bound to occur? When "Mr. Right" comes along? Or her family falls on rough times and money gets short? Or organic chemistry is tougher than anticipated? Point out that these factors will occur for everyone. However, she will be better ready to deal with these problems and the decisons that will be required. "Know thyself" and "Take control of your own life"—the two major messages of this book will enable your talented women students to make the continuing series of career and life decisions that will face them in the years ahead.

Appendix A
Resources for Teachers

This selected bibliography is aimed at certain areas related to using the Career Exploration modules. Some of these resources are referred to in the text; other resources can serve as background information.

I. Women and Science Careers

1. Kundsin, Ruth B., ed., *Women and Success: The Anatomy of Achievement*. W. Morrow and Co., New York, N.Y., 1974. Paperback, 256 pp. $3.45.
   An excellent resource for looking at career patterns and problems of women in science. The 35 essays include 12 autobiographies of successful, professional women and deal with family attitudes and relationships, the impact of education, economic and employment factors, and problems of the professional woman. This book is a "must" as background reading before leading a career exploration program for women interested, or potentially interested, in science careers.
2. Mattfeld, Jacquelyn A. and Carol G. Van Aken, ed., *Women and the Scientific Professions*. The M.I.T. Press, Cambridge, Mass., 1965. Paperback, $2.95.
   Similar in content to *Women and Success*. We recommend *Women and Success* over this book, but this book does provide additional insights.
3. Rever, Philip R., *Monograph Twelve: Scientific and Technical Careers: Factors Influencing Development During the Educational*

Years. ACT Publications, P.O. Box 168, Iowa City, Iowa, 52240. 1973. Paperback, $3.00.
If you want to get into the research regarding choice of scientific and technical careers, then Rever's very comprehensive review and recommendations for research is a good source.

II. Women Pursuing Professional Careers

1. Epstein, Cynthia Fuchs, *Woman's Place: Options and Limits in Professional Careers*, University of California Press, Berkeley, California, 1971. Paperback, $2.45.
   Although not aimed at science careers, this book does outline women's career patterns and problems they face in pursuing professional careers. This book is recommended for both student and teachers.
2. Smith, Caryl K., Walter A. Smith and Kala M. Stroup, *Counseling Women for Nontraditional Careers.* ERIC Counseling and Personnel Services Information Center. University of Michigan, Ann Arbor, Michigan, 1977. Paperback, $4.00.
   As part of ERIC/CAPS' Counselor Renewal Series, this book outlines five alternative hypotheses and associated procedures to encourage women into nontraditional careers. The book's methodology and extensive bibliography applies the approach of this book about science careers to all nontraditional careers.
3. Theodore, Athena, *The Professional Woman.* Schenkman Publishing Co., Cambridge, Mass., 1971. About $5.00, Paperback.
   Similar in scope to *Woman's Place*, but composed of 53 articles. Includes "Women in Science, Why So Few?", for example. *The Professional Woman* should be considered as supplemental to *Woman's Place.*

III. NSTA, Women, and Science

1. "Women in Science Education," *The Science Teacher*, Vol. 41, No. 7, October, 1974. p. 33.
   The National Science Teachers Association has recognized the obligation of science teachers to make special efforts to encourage outstanding women students to pursue the full range of science careers.

IV. Related Resources

1. Berkeley, California. Paperbound (approx. $5.00), or hardbound (approx. $9.00).
   Originally written for the career changer (something that eight out of ten people do in their lifetime), *Parachute* is an excellent re-

source for any person, student or teacher, who is thinking about a career choice.

2. Hansen, Lorraine S. (Sunny) and Norman C. Gysbers, eds., *Career Development: Guidance and Education*, a special issue of *The Personnel and Guidance Journal*, 53 (9), May 1975.
   The entire issue, but particularly the lead articles by the editors, outlines a career development model which provides a theoretical and practical framework into which this book can be placed. Career is "viewed broadly to stress life roles and life-styles, occupation being considered only one part of career," instead of as work for pay. The career development model cuts across all levels of education and all subjects; and both teachers and counselors have central roles to play in career education.
3. Levine, James A., *Who Will Raise the Children? New Options for Fathers (and Mothers)*. J.B. Lippincott Co., New York, N.Y. 1976.
   Heretofore young women have been concerned with how to fulfill their parental and career roles, while young men have primarily focused on their career roles. This exciting book describes various arrangements whereby men are taking a more central family role in child rearing. After you read Levine's book, share it with your students, male and female, who will be looking for new parental arrangements which reaffirm the responsibility and opportunity of parenting.
4. Seed, Suzanne. *Saturday's Child*. Bantam Books, New York, N.Y.
   For girls in grades 5-9, *Saturday's Child* depicts several successful women in a variety of careers from police officer to representative in the U.S. Congress. If you have younger female students, this paperback book is a nice introduction to thinking about a career choice.
5. Sheehy, Gail. *Passages: Predictable Crises of Adult Life*. E.P. Dutton & Co., New York, N.Y. 1976.
   We are well aware of developmental stages of children, but usually we have treated adulthood as a single stage. Sheehy shows us that adult life is punctuated by crises which serve as a passage from one to another developmental stage. By understanding these crises and stages, we and our students can have greater control of our lives.

V. Leading Career Workshops

1. Giffin, Kim and Bobbie Patton, *Personal Communications in Human Relations*. Charles E. Merrill Publishing Co., Columbus, Ohio, 43216, 1974.
   If you need an introduction to leading the kinds of groups described in this manual, then Giffin and Patton's book is a good place to start.